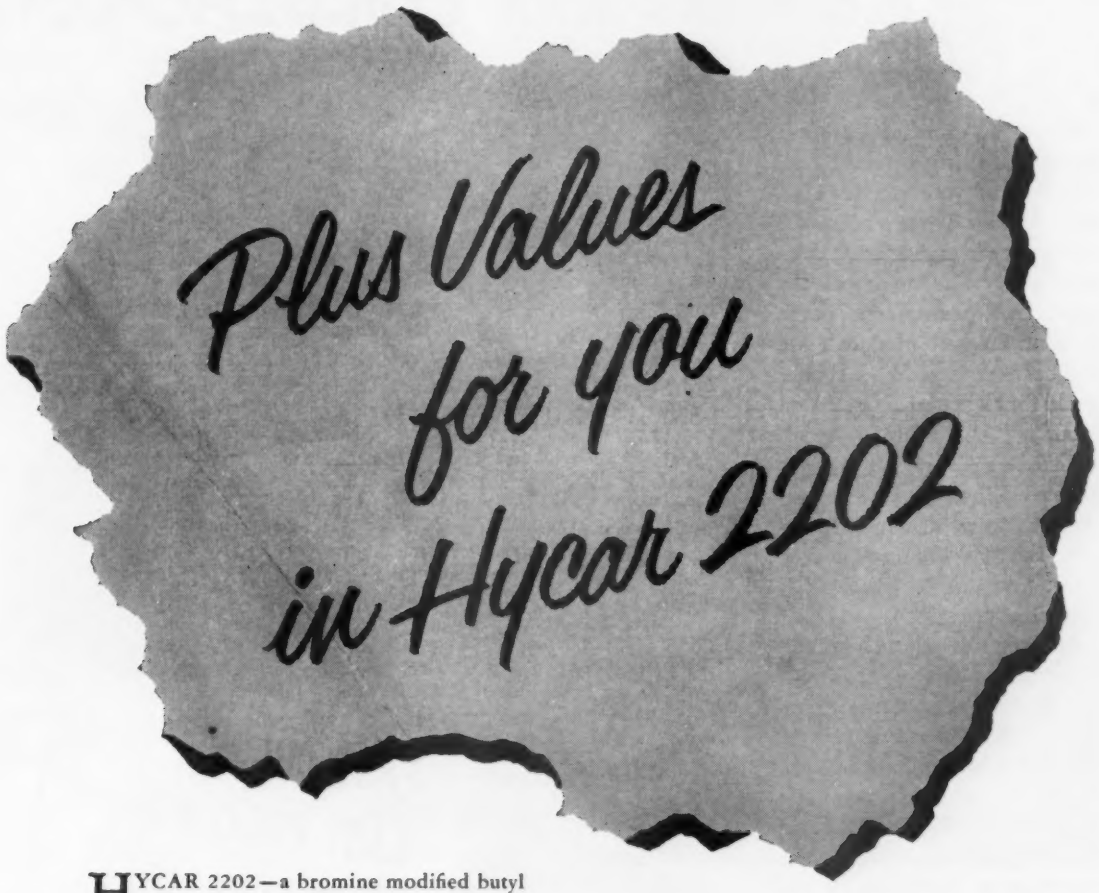
*News about*

# B. F. Goodrich Chemical *raw materials*




HYCAR 2202—a bromine modified butyl rubber—offers outstanding properties unobtainable with conventional butyl, yet retains the typical butyl properties of excellent ozone resistance, heat and light aging resistance, electrical resistance, and exceptionally low air permeability.

Check these plus values . . . they may add up to important new applications; perhaps show you how to improve an operation or make a superior product.

**CURES FASTER, MORE CONSISTENTLY** . . . good, consistent cures obtainable using only approximately one-half as much accelerator.

**EXCELLENT COMPATIBILITY** . . . can be blended and cured with crude, GR-S, butyl, and other rubbers.

**SUPERIOR BONDING** . . . adheres strongly to butyl, other rubbers, and metals.

**WIDE RANGE OF APPLICATIONS** . . . cement and adhesives, wire and cable, tire curing bags and bladders, inner tubes, coated fabrics, belts, hose and tubing, and mechanical goods.

Hycar 2202, originally introduced as Hycar HH, is now readily available in commercial quantities. For complete technical information, please write Dept. EP-1, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

**B. F. Goodrich Chemical Company**
**A Division of The B. F. Goodrich Company**

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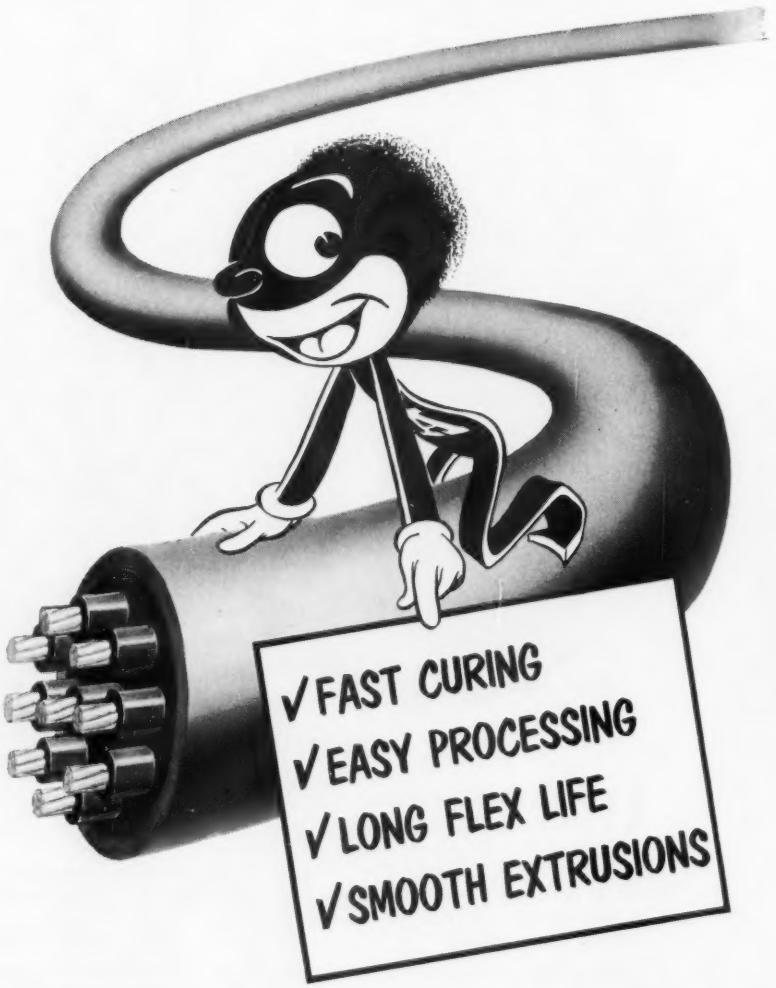
# Excellent wire and cable jackets are made with PHILBLACK® A!

Want an "expediter" to keep things running swiftly and smoothly in your plant? Philblack A, Fast Extrusion Furnace black, speeds mixing . . . processes easily . . . improves the appearance, pliancy and flex life of your finished product. Use this easy-going black in rubber stocks for all extruded or molded goods.

Philblack A is one of the four famous Philblacks, each a specialist in its particular field. By using the right Philblack in your recipe you can achieve desired characteristics.

And you can count on getting the same results every time with the Philblacks, because these carbon blacks are made to rigid standards of uniformity and quality. They're checked by physical and chemical tests at two-hour intervals during their manufacture. The Philblacks are exceptionally good. They can help *you* turn out better products, more easily and economically.




## *Meet the Philblacks!* KNOW WHAT THEY'LL DO FOR YOU!

**A** **Philblack A FEF Fast Extrusion Furnace Black**
Ideal for smooth tubing, accurate molding, satiny finish. Mixes easily. High, hot tensile. Disperses heat. Non-staining.

**I** **Philblack I ISAF Intermediate Super Abrasion Furnace Black**
Superior abrasion resistance at moderate cost. Very high resistance to cuts and cracks. More tread miles at high speeds.

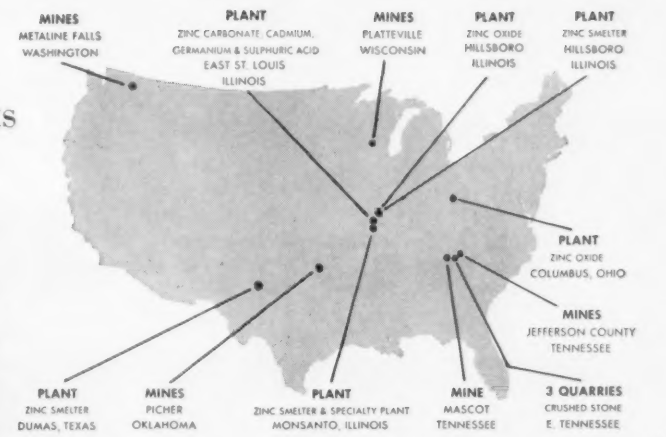
**O** **Philblack O HAF High Abrasion Furnace Black**
For long, durable life. Good electrical conductivity. Excellent flex. Fine dispersion.

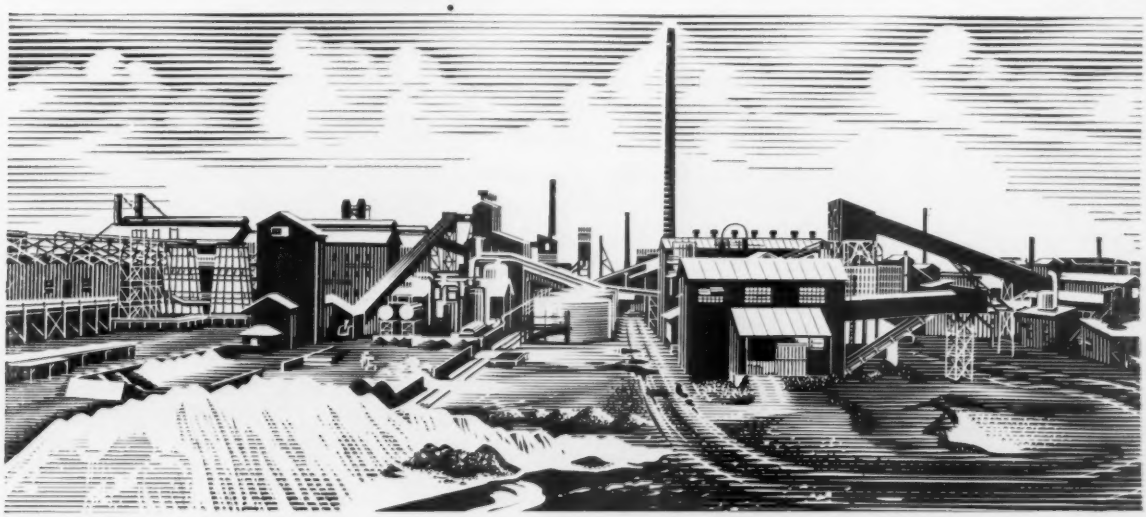
**E** **Philblack E SAF Super Abrasion Furnace Black**
Toughest black on the market. Extreme abrasion resistance. Withstands aging, cracking, cutting and chipping.

Phillips 66

**PHILLIPS CHEMICAL COMPANY,** Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. Export Sales: 80 Broadway, New York 5, N. Y.
West Coast: Harwick Standard Chemical Company, Los Angeles, California.

# American Zinc and its products *from* A *to* Z



FAIRMONT CITY, ILLINOIS
(East St. Louis)

Operations include: roasting and sintering of zinc concentrates; cadmium plant producing commercial balls, sticks and plates; zinc carbonate plant; germanium plant producing germanium dioxide for the electronics industry. Sulphuric acid is produced by both the Chamber and Contact methods. For complete picture of American Zinc operations, see map above.

**PRODUCERS OF**

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
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*Distributors for*

**American Zinc sales Company**

AMERICAN ZINC, LEAD & SMELTING COMPANY

*Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh*

# Now—it's "Wall

The fast-growing trend from wallpaper to "wall-plastic" holds much promise as a great, new field of application for vinyl resins.

Pictured at right is one of the early steps in the manufacture of *Cohyde* – a premium-quality, plastic coated fabric especially designed for use as a commercial, institutional and industrial wall covering.

This heavy-duty covering is made with a plastisol based on PLIOVIC AO–a vinyl copolymer resin. It is outstanding in its three-dimensional beauty and durability. It is designed to make the most of a momentum-gathering market.

PLIOVIC AO was selected for this application because it can be processed at relatively low temperatures. This not only makes for easier, more closely controlled production, but results in a more uniform product of better physical properties, by virtue of a shorter heat history being acquired.

Plastisols are economically compounded and processed with PLIOVIC AO, because it is an internally plasticized copolymer. This means its fine particles are more easily solvated than those of other resins, permitting use of a wider range of lower cost plasticizers and minimizing grinding. It also means the dispersion can be fused at as low as 280° F. for greater latitude in equipment and fabrics used.

If you plan on entering the "wall-plastic" field or on manufacturing any vinyl coated fabric, you'll find it to your advantage—processing- and product-wise—to know more about PLIOVIC AO. For details and the latest Tech Book Bulletin, write to:

Goodyear, Chemical Division, Akron 16, Ohio

Chemigum, Plioflex, Pliolite, Plio-Tuf, Pliovic—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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Plastics Department

CHEMIGUM • PLIOFLEX • PLIOLITE • PLIO-TUF • PLIOVIC • WING-CHEMICALS

High Polymer Resins, Rubbers, Latices and Related Chemicals for the Process Industries

# – Plastic"

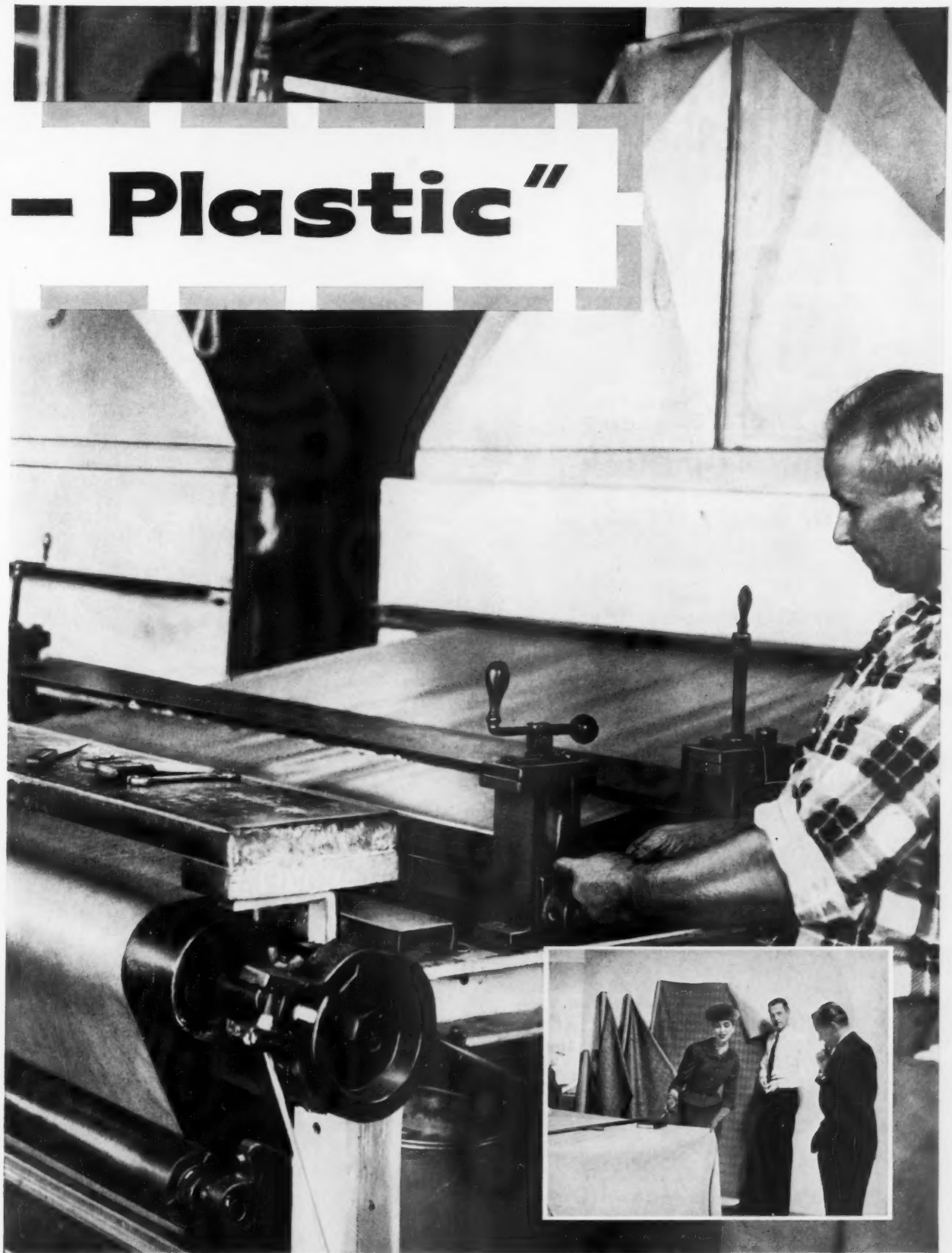

Photo courtesy Cotan Division, Interchemical Corporation, Newark, N.

Cohyde—T. M. Interchemical Corporation, New York, N. Y.

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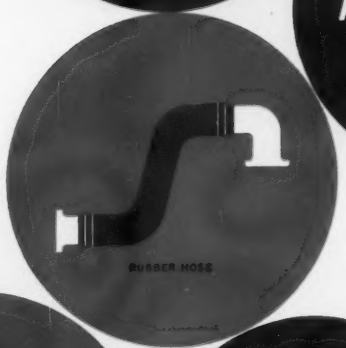
***There's a Huber Oil Black for Every Need!***

**AROMEX HAF**

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**AROVEL FEF**

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COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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NEWS CORRESPONDENTS

CARL S. HOGLUND
5107 Telegraph Road, Los Angeles 22, Calif. — Phone: ANgelus 1-8136.

PHIL GLANZER
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Microfilm copies of complete volumes of RUBBER AGE are available from: University Microfilms, 313 North First St., Ann Arbor, Mich.
Indexed in Industrial Arts Index and Engineering Index
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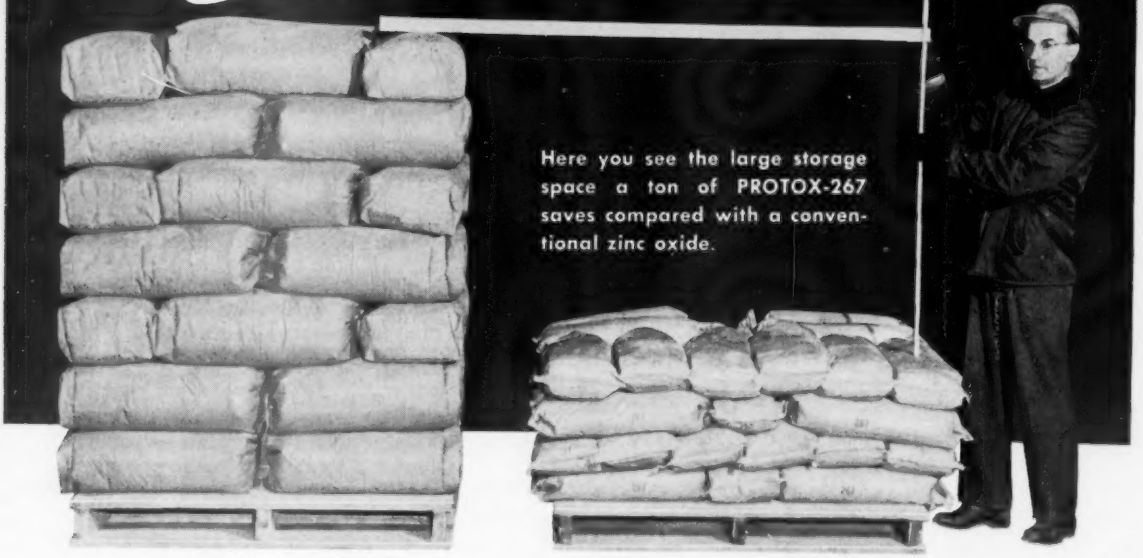
# EXPAND YOUR STORAGE SPACE... SLASH STORAGE COSTS




# WITH PELLETED PROTOX-267

*Whether you store zinc oxide in bags or bins, you can save valuable space with PROTOX-267*.*

**1. SAVE ON BAG STORAGE**

You can cut your oxide storage space and storage costs by as much as 67% with PROTOX-267—because that zinc oxide bulks 80 pounds per cubic foot as against 25–30 pounds for many conventional oxides.

**2. SAVE ON BIN STORAGE**

PROTOX-267 is a "natural" for storing in bins. Its high density saves space; its pellets, like peas on a knife-blade, have a low "angle of repose" and flow fast out of bins.

*U. S. Patents 2,303,329 and 2,303,330.

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TY-PLY BC alone is an excellent adhesive for the vulcanized bonding of cured and uncured Butyl rubbers to various types of elastomeric compounds.

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the two coat Adhesive System for bonding Natural Rubber and GR-S Compounds

**TY-PLY "Q" or "3640"**
the single coat Adhesive for bonding Natural and GR-S compounds

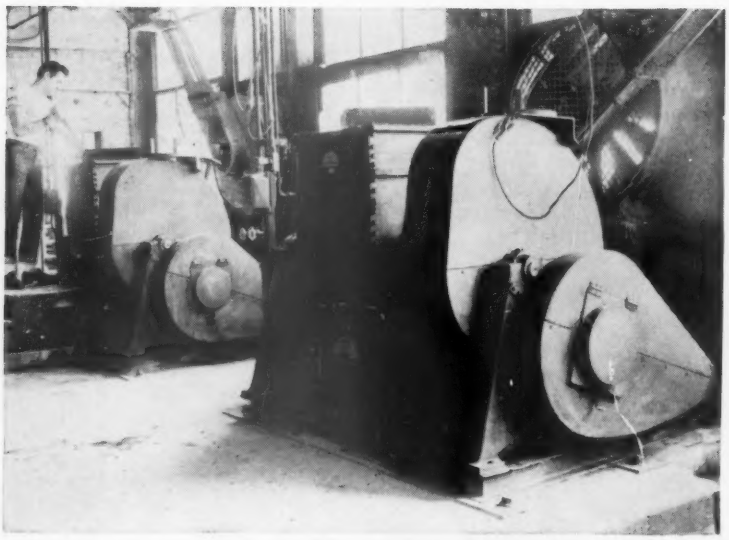
**TY-PLY "BN"**
for bonding N-types

**TY-PLY "S"**
for bonding Neoprene

***TY-PLY will adhere most vulcanizable rubber compounds to almost any clean metal surface***

**MARBON CHEMICAL**
*Division of BORG-WARNER*
**GARY, INDIANA**

***TY-PLY has stood the test of time . . . since '39***



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**#1** *It's faster* . . . delivers more production per hour.

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**#3** *It's safe* . . . special $CO_2$ seal on stuffing boxes (only 4 to 10 lbs. pressure) permits elimination of air from mix while protecting product from contamination by lubricants.

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# Letters to the editor

## Slight Confusion

Dear Sir:

There has been a great deal of confusion resulting from news releases issued by the various synthetic rubber companies because of the various terms used to rate capacities, such as "basic GR-S," "net rubber," "net rubber including oil," "gross rubber," "gross rubber including oil," etc. It is suggested that the industry make some attempt to adopt uniform terms which will clearly define what capacity is being described.

The capacities as sold by the government were all reported on the basic GR-S content, i.e., the "in balance" polymerization and drying capacity of the plant. It is suggested that this basic GR-S capacity be termed "net polymer" capacity. When oil is added to the "net polymer," it is suggested that this rubber be termed "net rubber." When carbon black is added, the term "gross rubber" is proposed.

As some of the plants sold by the government were already equipped to add oil their "net rubber" capacity could be reported as high as 37.5% above the "net polymer" capacity, which was the "rated capacity" upon which the plant was sold.

With this terminology in mind, we may say that our Port Neches plant was purchased at a rated capacity of 88,000 long tons of "net polymer." We have recently reported in the literature that plant improvements and the addition of oil masterbatching facilities (none were purchased from the government) have added approximately 75,000,000 pounds or roughly 34,000 long tons of additional capacity, bringing the total "net rubber" capacity to approximately 122,000 long tons.

C. F. RUEBENSAAL
Texas-U.S. Chemical Co.
New York, N. Y.

## Spraying Polysulfide

Dear Sir:

We have just read an article in your September, 1950, edition on "Flame Sprayed Polysulfide Coatings and New Methods of Application." We read this with much interest, generally because we have developed an improved and far more economical process of flame spraying a liquid composition of polyethylene and particularly because the U. S. Navy, Bureau of Ships, has handed us a problem in its Mil-P-15076A (Sept. 5, 1951) which seems to require Polysulfide, Thiokol type, for its solution.

We note that the flame spraying of powdered polysulfide has an applicatory rate of 10 to 15 square feet per *hour* "with a good operator," which was about the same as polyethylene, flame sprayed in powdered form. Our

# Helping YOU keep your products Uniform

Because you know that every shipment of C. P. Hall Company chemicals is exactly the same as the previous shipment, you can be sure of uniformity in the products you supply your customers. That uniformity means constant customer satisfaction. We insure constant uniform quality in every product we supply, by a rigid system of quality controls, because we realize we are protecting YOUR reputation, as well as our own.

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flame sprayed polyethylene composition, "Pyrothene," goes on at the rate of 16 square feet per *minute*, with an indifferent operator, due to its rapid spreading qualities and the automation of thermal controls in our Pyrocote equipment. We believe we can do the same thing with polysulfide, with the possibility of increasing its marketing area by making it feasible as a protective coating.

MALCOLM WHEELER-NICHOLSON

Pyrocote Chemicals, Inc.
Flushing, N. Y.

## It's an Idea

Dear Sir:

I am writing to suggest that you put a department in RUBBER AGE which would cover the formulation of recipes for compounds which not only meet the standard requirements of the trade on reclaim, natural rubber and synthetic rubbers, but also tricks and ideas in compounding, milling and especially to meet certain critical specifications of the government as well as ASTM requirements.

I know that this will probably be a lot of work, but it will be a most valuable asset to your magazine. Not only will the material people jump at an opportunity to furnish recipes but they would probably work with you 100 percent. Of course, there are many others who would likewise be very interested. It might be worth your while to work out some formulations and maybe, as a "far-fetched" idea, you might put a lab of your own in.

I have talked to quite a few of the material men and they show very much interest in this type of program. This may be just a "dream" now, but maybe you can execute it and make it come true.

GEO. E. CARLSON

Minn. Rubber & Gasket Co.,
Minneapolis 16, Minn.

*Memo from the Editor*

**The "Letters to the Editor" columns are inaugurated with this issue. They are open to all of our readers and we invite you to send along your comments for publication. These comments may be specifically applied to published articles and news items or may reflect your own views on any facet of the rubber industry. We reserve the right to edit all material. Address: Editor, RUBBER AGE, 101 West 31st St., New York 1, N. Y.**

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**PRECISION**
**DEPENDABILITY**
**are factors . . . .**
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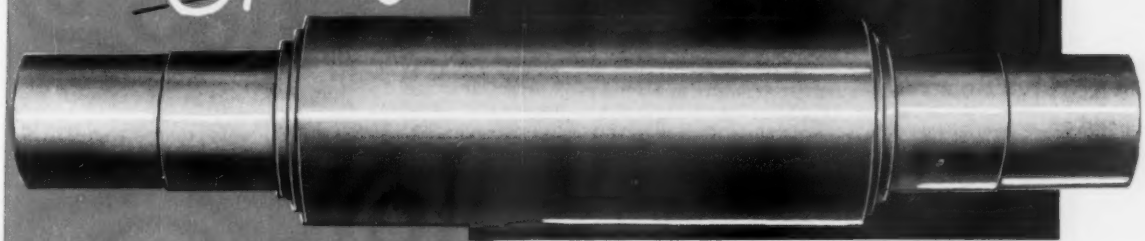

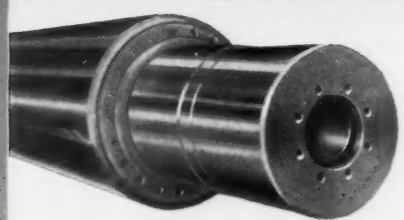

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MAINTAIN CORRECT DEPTH OF CHILL for iron or alloy iron rolls.

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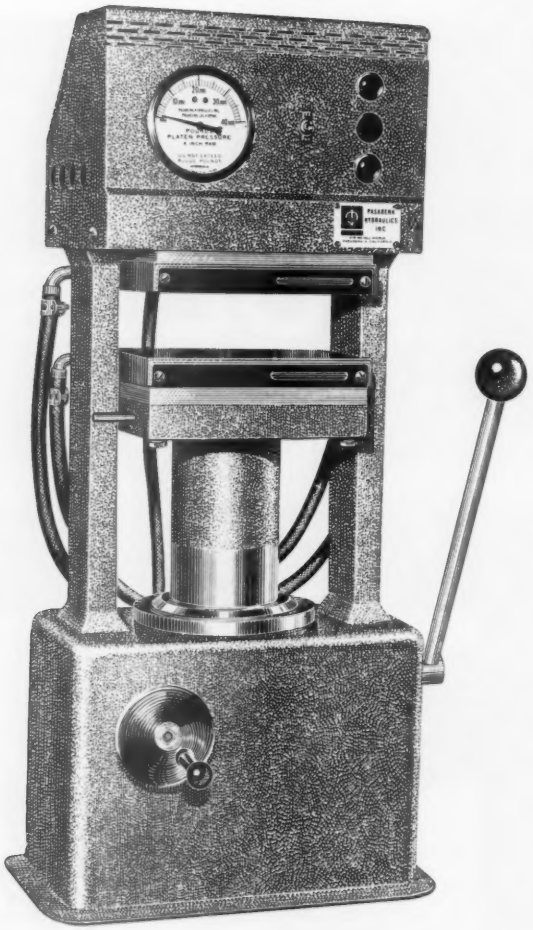

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* *Intermediate Super Abrasion Furnace carbon black*
** *Super Abrasion Furnace carbon black*

BEFORE BRUSHING

AFTER BRUSHING

# FAST
## flash removal

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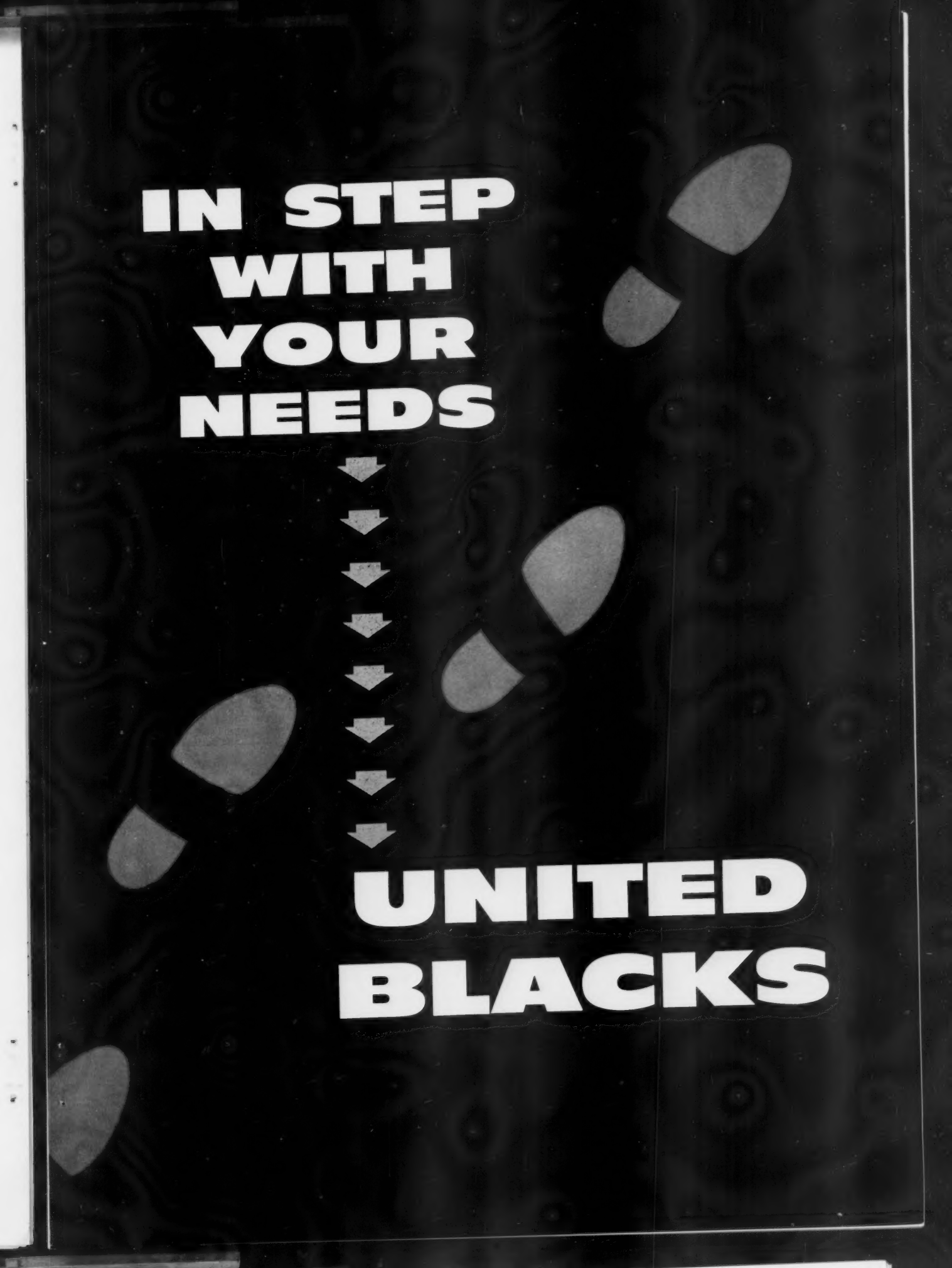
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WITH
YOUR
NEEDS
UNITED
BLACKS

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Kosmos 70 is in step with the need of an expertly-made black with stamina for modern rubber goods.

For excellence in blacks specify United. Their brands are a warranty of quality understood and sought after by compounders everywhere.

**UNITED CARBON COMPANY, INC.**

A subsidiary of United Carbon Company

CHARLESTON 27, WEST VIRGINIA

NEW YORK AKRON CHICAGO BOSTON MEMPHIS

**WALTER D. TAYLOR** — 1929: joined company. Served 5 years as machinist apprentice; 5 years as machinist; one year on gear drives. 1941: transferred to sales and service. 1945: made senior sales engineer. Presently manager of field service.

**RICHARD E. BAKER, JR.**—1937: came to Farrel-Birmingham from Ford Motor Company as skilled machine assembler. Erector for ten years, last two as group leader. 1946: transferred to Banbury division as sales-service engineer.

**GEORGE WILSON**—1940: joined Farrel-Birmingham as learner. Made machine assembler following year. 1943-55: machinery installation in customers' plants. 1955: transferred to Banbury division as sales-service engineer.

# 88 YEARS OF EXPERIENCE...
## ready to inspect your Banbury® mixers

**ALFRED W. MARSCH**—1940-44: Farrel-Birmingham apprentice. 1944-46: U. S. Army—returned to company as machine erector. 1954: transferred to Akron as sales-service engineer.

**EDWARD H. SHORTELL**—1941: started as learner-erector. Became machine assembler same year. 1945: made erector of machinery — has handled large installations in customers' plants. 1955: transferred to Chicago as sales-service engineer.

The five Farrel-Birmingham service engineers pictured above have spent a combined total of 88 years working on Banbury mixers. They know the Banbury inside and out . . . from hopper to discharge door . . . from drive to recording device. They understand the basic principles of the machine, and have behind them the facilities, knowledge and experience of the company which originated and brought the Banbury to its present state of development.

It's wise for anyone responsible for the maintenance of Banbury mixers to call in one of these men periodically. He will inspect gears, bearings, mixing chamber, etc., for wear — then make a detailed report with recommendations. The inspection, which is made without charge, necessitates stopping a machine for about an hour, and having a man available to assist.

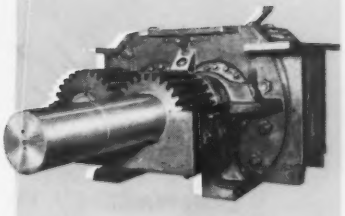
As a result of this inspection it may be possible to make adjustments and minor on-the-job repairs to keep your machine in production, and perhaps avert, or at least postpone, the need for major overhaul and parts replacement. All Farrel-Birmingham service men are salaried employees and share the company's interest in keeping your Banburys in top operating condition at the least expense to you.

*If you would like your Banbury mixers inspected, call or write and set a date that is convenient for you.*

**FARREL-BIRMINGHAM COMPANY, INC.**
ANSONIA, CONN. (REgent 4-3331)
AKRON 8, OHIO, 2710 First National Tower (PArtage 2-8871)
CHICAGO 3, ILL., 120 South LaSalle Street (ANdover 3-6434)
LOS ANGELES 21, CAL., 2032 Santa Fe Ave. (LUdlow 5-3017)
HOUSTON 2, TEXAS, 860A M & M Building (CApitol 2-6242)
FAYETTEVILLE, N. C., P. O. Box 3157 (3-0353)

*Farrel-Birmingham*®

FB-1050

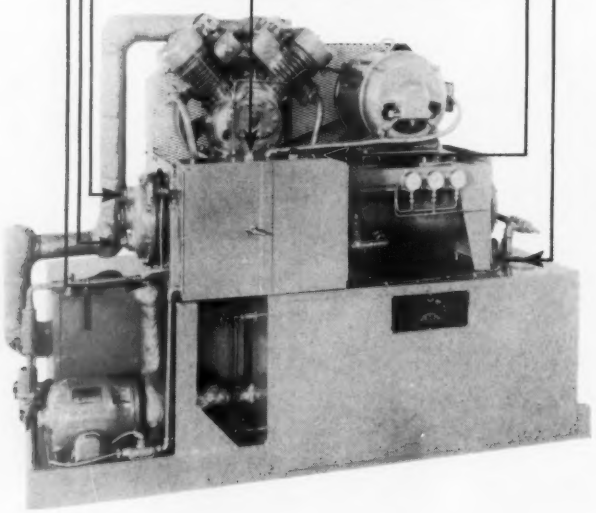


**TWO LOCATIONS— TWO PLANS FOR BANBURY BODY EXCHANGE**

1. For fastest service you can exchange a worn Banbury body for a new one. We carry large stocks of bodies at our Buffalo plant for shipment to western points, and at our Derby plant for shipment to eastern points.

2. When you can plan ahead on your shutdown period, we can reserve a rebuilt body from the number that is continually in process at our Derby plant. Rebuilt bodies cost less than new ones but carry the same guarantee.

# MAKE THESE CONNECTIONS
# TURN THIS SWITCH



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*Eliminates . .*

- DOWN TIME
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Increase Production
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Enlarge Profits

You will have cold, recirculated process water at the temperature and volume required for cooling Banburys, mixers, mills, calenders, sheet coolers, cooling rolls, baths, tunnels, extruders.

The refrigeration, pumping, storage and automatic control of cooling liquids is combined in one compact unit.

All component parts are matched and balanced to insure maximum efficiency and dependability. The unit is shipped complete, including all internal piping, wiring and controls. It requires no foundation or bolting down.

22 standard sizes from ¾ to 200 tons. Unit design is flexible to meet specific conditions. Engineering survey of requirements available without obligation.

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***The results will make you glad you did.***

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## PLASTICIZER

*circular file complete?*

Check this list of INDONEX Plasticizer Circulars. If you are missing any and would like to complete your file, circle the numbers you need in the coupon and mail. Your request will be given prompt attention.

Circulars contain suggested formulations for the applications described, specifications of INDONEX Plasticizer grades recommended for each application, physical data—original and aged—on the compounds, etc.

### Circulars Available INDONEX Plasticizers:

Circ. 4—in Tire Carcass Compounds
Circ. 5—in Footwear and Heel Compounds
Circ. 6—in Camel Back
Circ. 7—in Motor Mount and Bumper Compounds
Circ. 8—in Wire Jacket and Other Extruded Compounds
Circ. 12—in Low Hardness Mechanical Goods
Circ. 14—in Hycar OR-15
Circ. 15—in Natural Rubber-Reclaim Mechanical Goods and Carcass Compounds
Circ. 19—with Various Fillers in Reclaim Stocks
Circ. 21—in Mechanical Goods Compounds for High Temperature Curing
Circ. 22—in Natural Rubber of Various Qualities
Circ. 23—in Tire Curing Bag Compounds
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Circ. 40—in Polyacrylic Rubbers
Circ. 41—in Neoprene W. Compounds
Circ. 42—in GR-S Camel Back
Circ. 43—in Reclaim Compounds
Circ. 44—in Super-Aging Neoprene Compounds
Circ. 45—in Extruded Butyl Automotive Compounds
Circ. 46—in "Cold Rubber" (LTP GR-S) Compounds
Circ. 47—in High Mooney Neoprene (Type WHV)
Circ. 48—in Oil Resistant GR-S Compounds
Circ. 49—in Hard Rubber Compounds
Circ. 50—in Industrial Tire Compounds
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Circ. 52—in Molded Bumper Compounds
Technical Bulletin 13—General bulletin on INDONEX Plasticizers and their compatibility with other materials

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-CH-1345-

# Which sole has the SOLKA-FLOC®?

It's the sole that stays flat—holds its shape. And it makes a direct appeal to mothers who are constantly faced with the problem of teen-age wear.

Solka-Floc is the reason. It gives the necessary dimensional stability to flexible rubber soles, floor tile, and like products. Besides . . .

It reduces blistering and nerve, improves dispersion, controls shrinkage, permits sharper designs and harder, smoother surfaces.

A finely divided, highly purified wood cellulose, Solka-Floc speeds production, gives your product zip and appeal and is economical to use.

Let us show you how it can solve your specific process problems. Outline them in a letter to Technical Service, Dept. FG-1, Boston office.

BROWN QUALITY

COMPANY, Berlin, New Hampshire

*General Sales Office:*
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SOLKA PULPS • SOLKA-FLOC • NIBROC PAPERS
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TOILET TISSUE • BERMICO SEWER PIPE AND
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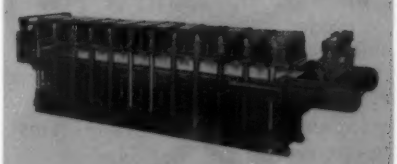
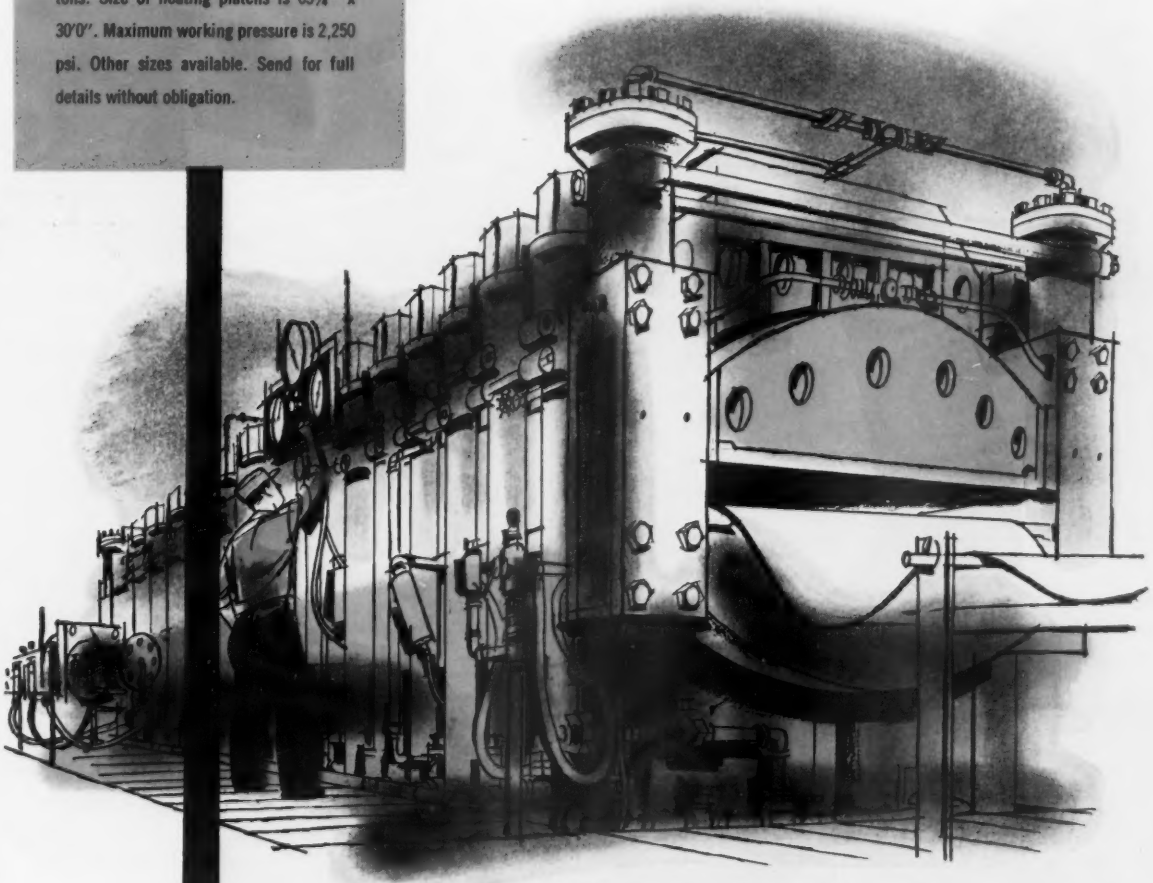
## *The standard by which other presses are judged*



Single Opening Belt Press for vulcanizing rubber belting. Press is equipped with hydraulic stretcher and clamping units mounted at the ends of the moving platen to maintain tension on belt while it is being processed. Press capacity is 3,180 tons. Size of heating platens is 63¼" x 30'0". Maximum working pressure is 2,250 psi. Other sizes available. Send for full details without obligation.

The proof of any press is its performance; excellence invariably shows up in service. How to be sure of quality when you choose a press? Simply look for the name 'R. D. Wood' on the nameplate. During more than 150 years, this name has never appeared on a press of inferior quality. In every R. D. Wood press, meticulous design, select materials, scrupulous craftsmanship combine to give you over-all efficiency, operating ease, production economy and long service. Write for engineering data on R. D. Wood presses for the rubber industry.



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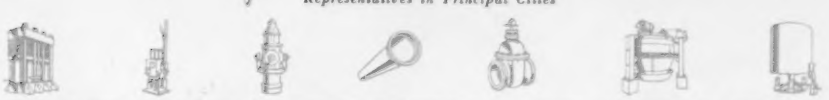

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Rutile types of TITANOX white titanium dioxide pigments are universally acceptable for most types of plastics—whether extruded, molded, sheet, or film-coated. For white and light tinted stocks, TITANOX-RA provides maximum whiteness, brightness and opacity. For heavily loaded stocks where the high opacity of "pure" titanium dioxide is not needed, TITANOX-RCHT or TITANOX-C-50 may be used.

But whatever the use, no other whitening agent gives plastic products the color and sparkle—the eye-catching appearance—that TITANOX does. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta 5; Boston 6; Chicago 3; Cleveland 15; Houston 2; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 14, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited, Montreal 2; Toronto 1.

3646-A

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In natural, GR-S, Neoprene and Butyl rubbers MICROFLAKE offers maximum protection against the action of atmospheric deterioration. Blooming to the surface, it forms a continuous protective film which does not change under varying climatic conditions, due to the migration rate being fairly constant at high or low temperatures.

Low melting point of MICROFLAKE, plus its very small thin flake size assures rapid and complete dispersion during mixing. It has no effect on the rate of cure.

MICROFLAKE is recommended for passenger car, truck, and tractor tires, channel rubbers, weatherstrips, boots, gas tank filler, neck grommets, insulated wire and cable, hose, belting, footwear, clothing, druggist sundries, and sponge rubber products such as door and trunk sealers.

A test sample incorporated in any of your compounds will convince you of MICROFLAKE's outstanding protective qualities. Write us today. . . . No Obligation, of course.

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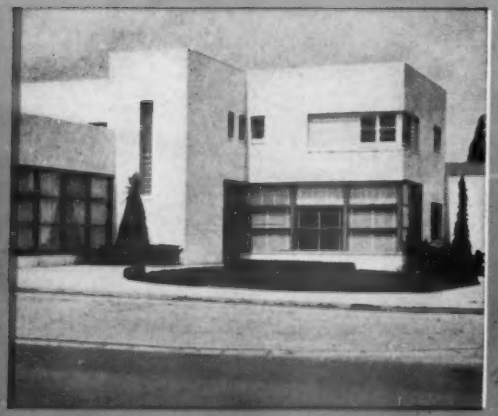
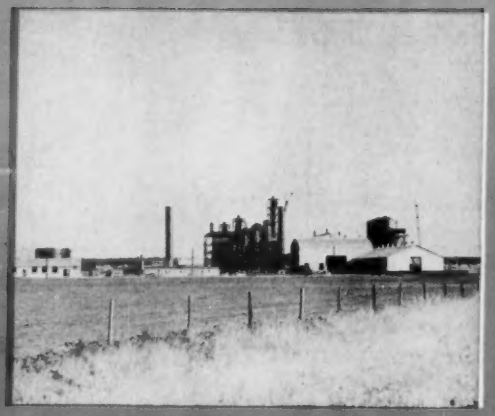
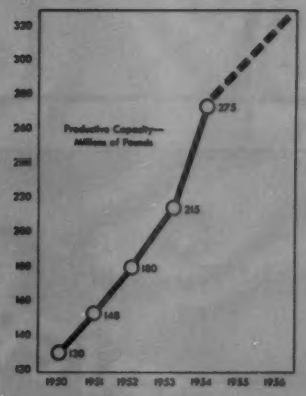
# DYNAMIC GROWTH
## in Carbon Blacks . . .
## by
# WITCO-CONTINENTAL



**Active Center of Carbon Black Research** is the WITCO-CONTINENTAL Laboratory at 1400 W. 10th Avenue, Amarillo, Texas.



**Modern Production Facilities,** such as this new plant at Ponca City, Oklahoma, enable WITCO-CONTINENTAL to produce a complete line of carbon blacks. Latest process controls assure rigorous uniformity of grades in all 5 WITCO-CONTINENTAL plants.




Production, research and technical service have shared in the dynamic, yet balanced, growth of WITCO-CONTINENTAL as a producer of carbon blacks.

As our production grows, we are continually expanding our services to provide rubber manufacturers with every benefit of modern carbon black technology.

Call on WITCO-CONTINENTAL for prompt sales and technical service in carbon blacks.

## *Witco-Continental*
## CARBON BLACKS

### FURNACE BLACKS

**Continex® SRF** — Semi-Reinforcing
**Continex SRF-NS** — Non-Staining
**Continex HMF** — High Modulus
**Continex HAF** — High Abrasion
**Continex FEF** — Fast Extruding
**Continex ISAF** — Intermediate Super Abrasion
**Continex CF** — Conductive Furnace

### CHANNEL BLACKS

**Continental® AA** — (EPC) — Witco No. 12
**Continental A** — (MPC) — Witco No. 1
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**Continental R-40** — (CC) — Conducting

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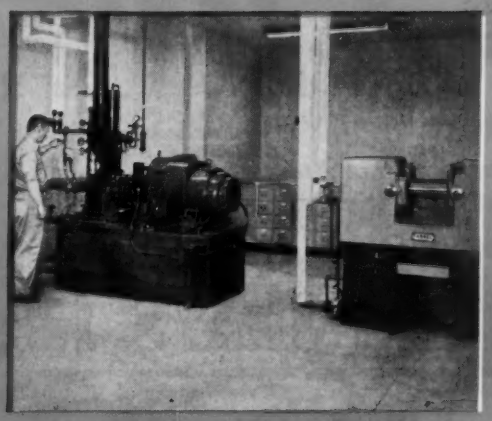
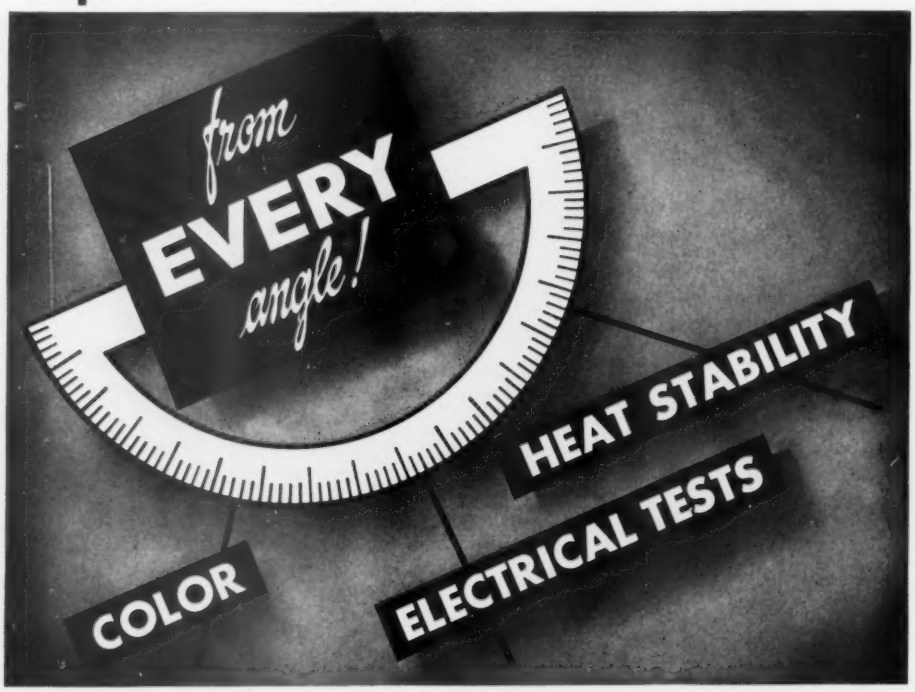


**New Technical Service Laboratory** at 213 West Bowery Street, Akron, is completely equipped to handle customers' formulation problems.

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**Sample and technical data sent promptly on request**

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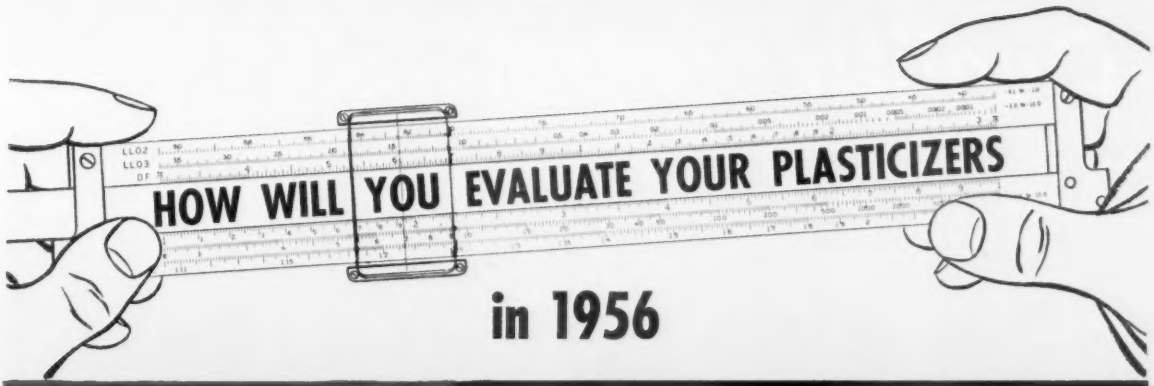

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PX-114 Decyl Butyl Phthalate
PX-118 IsoOctyl Decyl Phthalate
PX-120 Dilso Decyl Phthalate
PX-138 DiOctyl Phthalate
PX-208 DilsoOctyl Adipate
PX-209 DiNonyl Adipate
PX-220 Dilso Decyl Adipate
PX-238 DiOctyl Adipate
PX-404 DiButyl Sebacate
PX-438 DiOctyl Sebacate
PX-800 Epoxy
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## St. Joe lead-free Zinc Oxides for Rubber Compounds

REGULAR • COATED • PELLETS

The ore from which St. Joe lead-free Zinc Oxides are mainly produced originates in the foothills of the Adirondack Mountains, where the St. Joseph Lead Co. wholly owns and operates zinc mines at Balmat and Edwards, St. Lawrence County. These properties are among the greatest zinc deposits in the United States. The concentrates produced here are shipped to our electrothermic zinc smelter at Josephtown, Pa. for conversion into zinc oxides by the direct-from-ore, or American Process. Quality control – one of St. Joe's most important production tools–literally begins underground at the mine and is exercised at each step of the process by the technological staffs of laboratories located in our mines, mills and the smelter. The ores, equipment and procedure used in the production of St. Joe High-Grade Zinc metal of 99.98+% purity – and commanding a premium market price – are identical with those used in the production of St. Joe lead-free Zinc Oxides. This quality-factor accounts for their steadily increasing use in rubber compounds.

*from ORE – *The Balmat Mine: The mine, mill and town of Balmat, N.Y., developed and built by the St. Joseph Lead Co., between 1926 and 1938. The Company's other mine and mill is located in the nearby town of Edwards, N.Y.*

*to OXIDE – *The St. Joseph Lead Company's smelter and zinc oxide plant at Josephtown, Pa., on the south bank of the Ohio River about 30 miles northwest of Pittsburgh.*

ST. JOSEPH LEAD COMPANY
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Calcene has been a headliner since 1933. At that time, there was only one calcium carbonate commercially available in fine particle size, and that was not a domestic material. Columbia-Southern research set out to fill this gap, and its new development called Calcene has been a pacesetter ever since.

The principal advantage of Calcene over other white pigments was in tear resistance. Rubber compounders with this problem became logical customer prospects and users. Better tensiles, easier processing and lower unit costs came along as added attractions. When World War II spawned GR-S, which badly needed reinforcement, Calcene was already on the scene and slipped easily into a host of new applications.

Through the years, Calcene production has had to adjust itself to changing events. When coconut oil became a war-time casualty, tall oil was ready to step in and take over. This and other changes made necessary in the basic production of Calcene have always resulted in some advancement in the utility of the product.

Calcene TM or Calcene NC (not coated) remain the best buy in fine carbonates to fill your needs, with an unmatched record of service and performance in industry. For further information and experimental working samples, write today to Columbia-Southern Chemical Corporation, Pigments Department, One Gateway Center, Pittsburgh 22, Pennsylvania.

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IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division

# Fabric helps keep power under wraps ...underwater



Three different kinds of fabric tapes are used in this Okonite high voltage power cable.

"Packaging" power to do a job is a long-time specialty of the Okonite Company, Passaic, New Jersey. Their submarine electrical control and high voltage cables must not only deliver power, but also long lasting, reliable and efficient operation. Fabric is a partner in this job. Okonite uses Wellington Sears "Columbus" sheeting in a variety of forms for cable assembly. This sheeting fabric is outstanding for uniformity of quality, durability and mechanical strength. It is processed by Okonite into binder, curing and semi-conducting tapes for "wrapping-up" cable components—some more than 4 miles long. It is interesting to note that "Columbus" sheeting is used by industry not only for tapes, but for other coating and rubberizing applications, such as automobile and furniture upholstery, luggage and hospital sheeting. It is representative of the wide range of fabric constructions—cotton and synthetic—available to the rubber industry from Wellington Sears. If you think you can use our century of experience as "Headquarters For Industrial Fabrics," let's get together—or write us for illustrated booklet "Modern Textiles For Industry." Address Dept. I-G

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*A Subsidiary of West Point Manufacturing Company*

***FIRST In Fabrics For Industry***

***For Mechanical Goods, Coated Materials, Tires, Footwear and Other Rubber Products***

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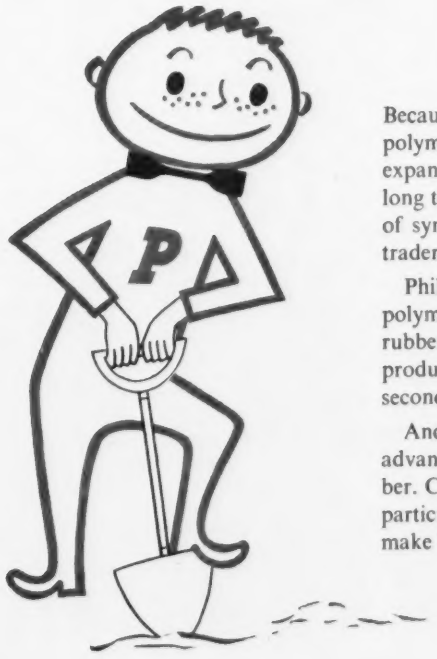
# We're Expanding Our Plant

# to make more Philprene®




Because of greatly increased customer demand for our polymers and masterbatches, Phillips has launched an expansion program to provide an additional 20,000 long tons annually of the more than 20 different types of synthetic rubber materials bearing the PHILPRENE trademark.

Phillips will expand the capacity of its Plains copolymer plant by 37 per cent to meet the growing rubber needs. A substantial portion of this additional production is expected to become available in the second half of 1956.

And remember—you have at your disposal the full advantages of our long experience and research in rubber. Consult our Technical Representative about your particular rubber needs. We like to help our customers make better products . . . and better profits.

| CURRENT PHILPRENES | *Each is comparable to former GR-S with the same numerical designation except 1605 and 1803 as noted below.* HOT | COLD | COLD OIL EXTENDED |
|---|---|---|---|
| POLYMERS | PHILPRENE 1000<br>PHILPRENE 1001<br>PHILPRENE 1006<br>PHILPRENE 1009<br>PHILPRENE 1010<br>PHILPRENE 1018<br>PHILPRENE 1019 | PHILPRENE 1500<br>PHILPRENE 1502<br>PHILPRENE 1503<br>NOTE: PHILPRENE 1019 AND 1503 ARE ESPECIALLY DESIGNED FOR THE WIRE AND CABLE INDUSTRY | PHILPRENE 1703<br>PHILPRENE 1706<br>PHILPRENE 1708<br>PHILPRENE 1711<br>PHILPRENE 1712 |
| MASTERBATCHES | PHILPRENE 1100<br>PHILPRENE 1104 | PHILPRENE 1600<br>PHILPRENE 1601<br>PHILPRENE 1602<br>PHILPRENE 1605*<br>*Philblack A cold rubber masterbatch | PHILPRENE 1803<br>similar to GR-S 1801 but incorporating 25 parts Philrich 5 |

**PHILLIPS CHEMICAL COMPANY**

**Rubber Chemicals Division**

**318 Water Street, Akron 8, Ohio**

Phillips 66

JOHN S. COLEMAN

*Portrait by Fabian Bachrach*

# "I am proud that 80% of Burroughs Employees..."

"I am proud that 80% of Burroughs employees are enrolled in systematic savings in U. S. Savings Bonds through the Payroll Savings Plan. The record of the response of our men and women to our recent campaign speaks for itself. It is evidence of the desire to save, and to save in a way which benefits both the individual and the nation. I hope that every employer will take advantage of this opportunity to serve the interest of both his employees and the country by cooperating with the Department of the Treasury in the U. S. Savings Bonds campaign."

**JOHN S. COLEMAN,** ***President***
***Burroughs Corporation***

What is the percentage of employee participation in *your* Payroll Savings Plan?* If it is less than 50%, your State Sales Director will be glad to show you how easy it is to raise participation to 60% or higher. He will furnish Payroll Savings Application Blanks, and all the printed promotional material you can use. Write today to Savings Bonds Division, U. S. Treasury Department, Washington 25, D. C.

*If your Company does not have the Payroll Savings Plan, your State Sales Director will help you to install it.

*The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and*

**RUBBER AGE**

## Nonfading, Nonbleeding Colors for Rubber Goods

# GLIDDEN CADMOLITH REDS and YELLOWS

Glidden Cadmolith Colors offer you a combination of advantages found in no other red or yellow pigments. They are soft and easy to grind, alkali and acid resistant, insoluble in all vehicles, opaque and high in heat resistance.

Permanency of color is assured in all types of finishes when Cadmolith Colors are used as the sole pigment, and is enhanced when these colors are used as shading or tinting colors.

Available in four shades of yellow and five shades of red.

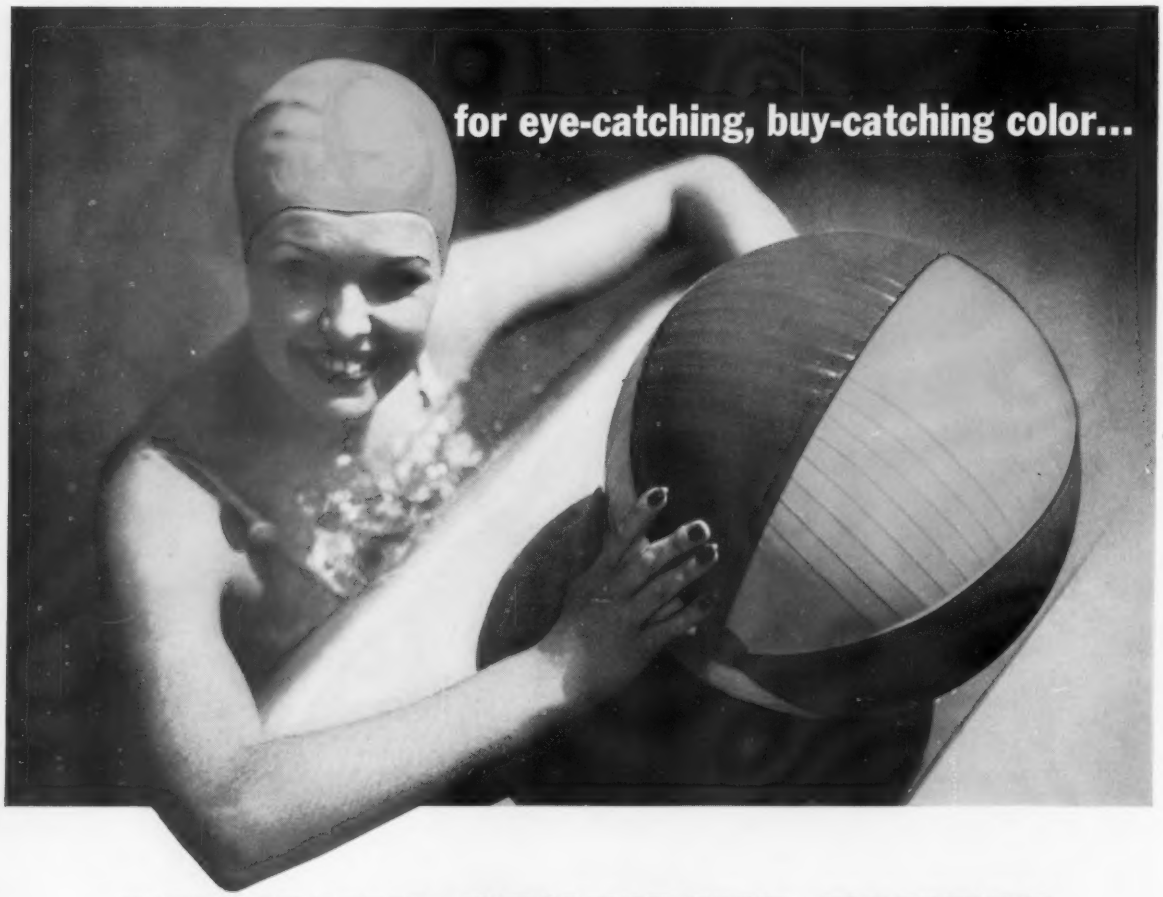
**SEND FOR THIS FOLDER** giving complete details, with color chips. Write The Glidden Co., Chemicals-Pigments-Metals Division, Union Commerce Building, Cleveland 14, Ohio.

**THE GLIDDEN COMPANY**

**Chemicals — Pigments — Metals Division**

Baltimore, Md. • Collinsville, Ill. • Hammond, Ind. • Scranton, Pa.

QUALITY Glidden PRODUCTS



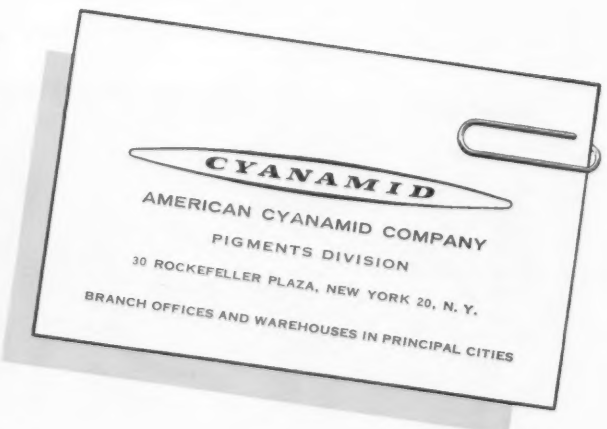

# CYANAMID BENZIDINE TONERS

## Benzidine Yellow Toner 45-2555 • Benzidine Orange Toner 45-2850

These strong, clean, chemically stable organic toners impart bright, highly visible colors to a wide variety of rubber products. They are lightfast, non-migrating, non-darkening and stable to acids, alkalis and sulfurous chemicals.

Cyanamid Benzidine Toners offer a wide range of colors, from bright lemon yellow to clean rich oranges, for bathing caps, balloons, toys and miscellaneous druggists' sundries.

Your Cyanamid Pigments representative will be glad to give you full information for making the most effective use of Benzidine Toners in your rubber products.


CYANAMID
AMERICAN CYANAMID COMPANY
PIGMENTS DIVISION
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
BRANCH OFFICES AND WAREHOUSES IN PRINCIPAL CITIES

**COLOR IS THE DIFFERENCE**

# NEW

## PLASTOLEIN® 9404 TGP

*a superior*
*synthetic rubber plasticizer*
*at lower cost!*

New Plastolein 9404 TGP (triethylene glycol dipelargonate) offers superior performance in synthetic rubbers. Yet it *costs less* than commonly used low-temperature plasticizers.

For example, as compared to other more expensive glycol-type esters and adipate plasticizers, 9404 gives lower heat loss, lower compression set, less water sensitivity and equivalent low-temperature flexibility.

In addition, since Plastolein 9404 is produced in accurately controlled equipment from easily obtainable domestic raw materials, high quality standards are maintained and continuing availability assured.

*For detailed information on Plastolein 9404 TGP, mail coupon, or write for an evaluation sample.*

Emery

**Fatty Acids & Derivatives**
**Plastolein Plasticizers**
**Twitchell Oils, Emulsifiers**

**Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio**

New York • Philadelphia • Lowell, Mass. • Chicago • San Francisco • Cleveland
*Warehouse stocks also in St. Louis, Buffalo, Baltimore and Los Angeles*
**Export:** Carew Tower, Cincinnati 2, Ohio

**Emery Industries, Inc.**
**Dept. U-1, Carew Tower, Cincinnati 2, Ohio**

Please send me bulletin on Plastolein 9404 TGP.

*Name*.....*Title*.....

*Company*.....

*Address*.....

*City*.....*State*.....

# Goodrich-Gulf Chemicals, Inc.

**Facilities being expanded to meet the demands of industry for rubber**

A FAMOUS NAME...
AN ESTABLISHED PRODUCT

**Ameripol** REG. U.S. PAT. OFF.
**RUBBER**

COLD NON-OIL POLYMERS
COLD OIL MASTERBATCH POLYMERS
HOT NON-OIL POLYMERS

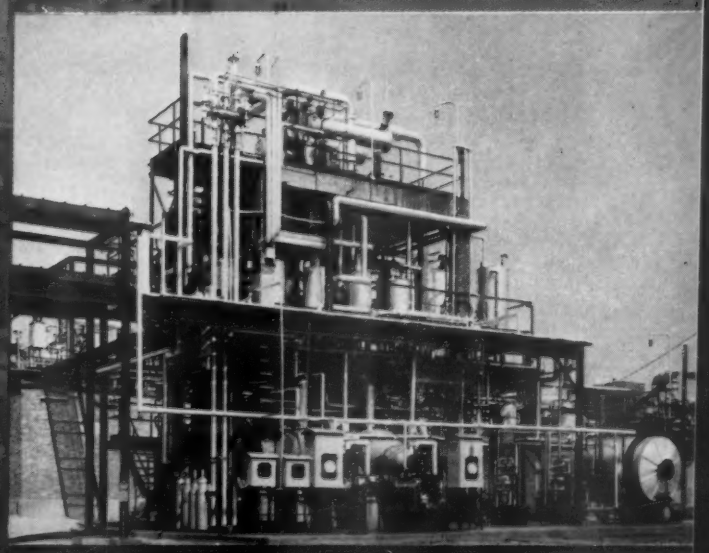
**The name to remember for quality backed by years of research and experience**

## Goodrich-Gulf Chemicals, Inc.

3121 EUCLID AVENUE, CLEVELAND 15, OHIO

*Coming to our Moundsville W. Va. plant...*

# DOUBLE CAPACITY!



*for the production of high quality* **ANILINE**

After only a year of commercial production, we are doubling the output of our Aniline plant at Moundsville to meet the demand of quality-minded Aniline users.

Made by a continuous catalytic hydrogenation process developed in National Aniline Laboratories, this aniline sets a new standard in the industry. It is water white . . . extremely pure and uniform . . . meets or exceeds the A.C.S. Specification for C.P. Aniline.

Because of our strategic location on the Ohio River you can be sure of dependable delivery by rail, truck or inland waterways. We will be pleased to furnish samples, specifications, price and delivery quotations.

**NATIONAL ANILINE DIVISION**
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

Boston Providence Philadelphia Chicago San Francisco
Portland, Ore. Greensboro Charlotte Richmond Atlanta
Los Angeles Columbus, Ga. New Orleans Chattanooga Toronto

National Aniline Allied Chemical

# SILASTIC GUMS help your research men turn the wheels of progress

Here's the first silicone rubber tire ever produced. Built in cooperation with Dow Corning by a group of rubber research and development engineers, this tire was designed to explore another area of potential usefulness for Silastic.* Such studies become more urgent as design engineers find an increasing need for rubbery materials that retain good physical and dielectric properties in service at temperatures above 200 F. Looking toward future developments in tires, mechanical rubber parts or electrical insulating systems, you'll find that Dow Corning is your best source of silicone rubber research materials and technical assistance. We offer your research men sample quantities of the most complete line of silicone gums available — sulfur vulcanizing, peroxide vulcanizing and fluid types.

**These Silastic PROPERTIES mean better products . . .** *Low compression set without toxic additives. Serviceability at temperatures ranging from —100 F to 500 F. Maximum resistance to weathering, ozone, corona. Ideal dielectric properties. High tensile strength with silica fillers.*

**Easier PROCESSING means lower products costs . . .** *Easy-to-compound Silastic Gums or master-batches reduce processing time, assure more efficient use of your mills, save capital investment in extra equipment. Dow Corning's 10 years of experience in compounding silicone rubber is available to you either in the field or at Midland, Michigan.*

*TM REG. U. S. PAT. OFF.

1955 AWARD
CHEMICAL ENGINEERING ACHIEVEMENT

DOW CORNING CORPORATION

MIDLAND, MICHIGAN

***Send this coupon today for more information and samples!***

Dow Corning Corporation
Midland, Mich., Dept. 9201

Please send me ☐ additional information ☐ samples—Silastic Gums

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

# Rubber Epicure?

## —here's a recipe that will delight you!

**SLAB SOLE COMPOUND**

| | Parts by Weight |
|---|---|
| GR-S, 1006 | 90 |
| High Styrene Resin | 10 |
| NEVILLE LX-685, 135 | 12 |
| Antioxidant | 1 |
| Calcium Silicate | 50 |
| Hard Clay | 200 |
| Zinc Oxide | 5 |
| Process Oil | 5 |
| Mold Lubricant | 2.5 |
| Stearic Acid | 1.5 |
| Benzothiazyl Disulfide | 1.5 |
| Zinc Dimethyl Dithiocarbamate | 0.5 |
| Rubbermakers Sulfur | 4 |
| **Total** | **383.0** |

For extremely high hardness, approximately 5 parts of phenolic resin may be added

**Cure: 6 minutes at 310°F.**
**Specific Gravity: 1.66**
**Hardness, Shore A: 96**
**Color: Light Brown**
**Mold Release: Good**
**Hot Tear Resistance: Good**
**Cost per pound (estimated): $.092**

*To Satisfy Your Epicurean Taste for*

EASE OF PROCESSING
HIGH HARDNESS
ABRASION RESISTANCE

*at low cost specify*
NEVILLE LX-685,135

**NEVILLE CHEMICAL CO.**
**PITTSBURGH 25, PA.**
*Plants at Neville Island, Pa., and Anaheim, Cal.*

NEVILLE

R-56

# enter the fabulous NEW

Look for this man!
...your Velsicol Representative a qualified chemist who can show you how to make rubber products at lower cost with Velsicol Hydrocarbon Resins.

# VELSICOL $1,000,000 Recipe Contest

## Here's all you have to do!

- Fill out the coupon below for a free sample of Velsicol Hydrocarbon Resins
- Test Velsicol Hydrocarbon Resins in your rubber compounds
- Compare the results with your present recipes

## THREE BIG FIRST PRIZES!

**1. BETTER PRODUCTS**
*Velsicol Resins will make your products perform better in use, and do better in the market place. This prize is worth at least a million to your pride, prestige, and* **company profits.**

**2. LOWER PRODUCTION COSTS**
*You have your choice of taking this prize in the form of greater profits or, if you're far sighted, in lower prices that will win customers and murder competition.*

**3. INCREASED SALES**
*This prize will get you your company's "Genius Cum Laude Award", not to mention the mundane delights of financial gain.*

VELSICOL
CHEMICAL CORPORATION

VELSICOL

**VELSICOL CHEMICAL CORPORATION**
Dept. 80, 330 East Grand Ave., Chicago 11, Illinois
Gentlemen:
☐ Please send me your technical bulletin No. 218.
☐ Please send me samples of Velsicol Resins.

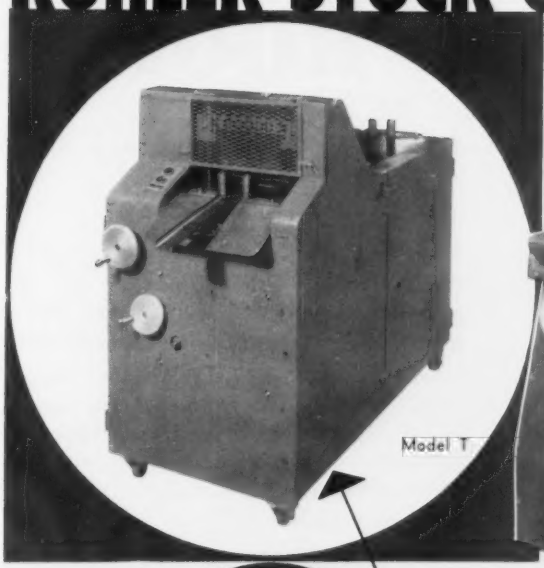
NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

*Mail the coupon now for* **FREE** *samples and technical literature!*

# CUT COSTS! CUT TIME! CUT WASTE!

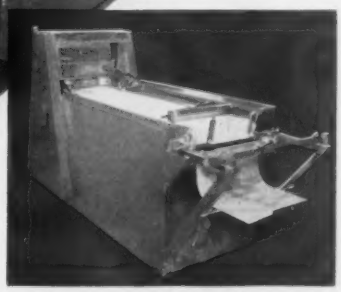
# KOHLER STOCK CUTTING MACHINES

**Guillotine type for flat or tubular stock**



Model T

Model F



Rear view of Model F machine.

Model F machine for calendared or flat stock. Built in conveyor. Pivoting blade available for diagonal cuts.

Model T machine. Use with tubing machine or like. Continuous feed.

These machines can be seen in operation, anytime. Call for appointment.

**OUTSTANDING FOR CONTROLLED ACCURACY**

**SYNCHRONIZED POSITIVE MECHANICAL DRIVE**

**ADJUSTABLE WHILE IN MOTION**

**THERE IS NO MACHINE ON THE MARKET WHICH CAN CUT WITH THE ACCURACY OF KOHLER MACHINES.**

**KOHLER CUTTERS FEATURE**

- Continuous feed
- Handles flat or tubular stock, cured or uncured
- Dual feed, top and bottom surface contact
- Compensated take-up to handle any thickness
- Will accommodate extruded, milled, calendared, or most any stock
- Adjustable speed and cut length, in motion
- Available with switch blades for alternate diagonal cuts
- Available with roll feed, belt feed, or both
- Vernier controlled adjustments
- Models and sizes to handle any job

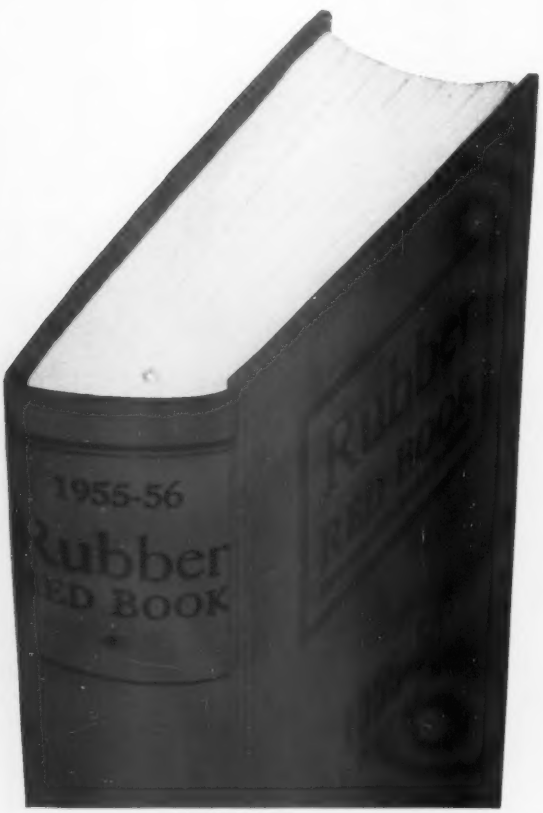
***CALL ON US FOR CUTTERS, CONVEYORS, MOLDS, TRIMMERS AND BUFFERS***

**KOHLER MOLD and MACHINE CO.**

**1335 Kenmore Blvd.** **Akron 6, Ohio**

# Announcing the 1955-56 Edition of the

# RUBBER RED BOOK




**1955-56 Edition** **Tenth Issue**
**1250 Pages** **Cloth Bound**

•

**PRICE: $10.00 postpaid**

**Now Available — the 1955-56 RUBBER RED BOOK — the *Directory of the Rubber Industry* — the biggest (1250 pages) and most complete ever published!**

Up-to-the-minute data reflecting the growth of the rubber industry. This edition features an expanded section on synthetic rubbers and rubberlike materials in keeping with the recent transfer of the synthetic rubber industry to private hands.

The 1955-56 Edition is divided into three sections:

I. RUBBER MANUFACTURERS—with personnel, products manufactured, and a geographical breakdown of rubber plants.

II. SUPPLIERS—complete product classifications for machinery, chemicals, fabrics and textiles, rubber (all types, including reclaim and scrap), latex, etc., with full names and addresses.

III. WHO'S WHO—*the* complete listing of all persons in the rubber industry together with their company connections, title and full address.

Other sections offer valuable information on consulting technologists, sales agents and branch offices, educational courses in rubber chemistry and technology now being offered, technical journals, trade and technical organizations, and much more.

The RUBBER RED BOOK has become, through the years, the most widely-used book in the rubber industry. Without doubt, it is *the* indispensable tool of the industry!

## RUBBER AGE

## 101 West 31st Street, New York 1, N. Y.

# Summary of Contents

# 1955-56 RUBBER RED BOOK


RUBBER MANUFACTURERS IN THE UNITED STATES
- Alphabetical Section
- Classified List of Rubber Products
- Geographical Section

RUBBER MANUFACTURERS IN CANADA

RUBBER MACHINERY AND EQUIPMENT
- Classified List of Machinery
- Machinery Manufacturers and Addresses

LABORATORY AND TESTING EQUIPMENT
- Classified List
- Suppliers and Addresses

ACCESSORIES AND FITTINGS
- Classified List of Products
- Suppliers and Addresses

RUBBER CHEMICALS AND COMPOUNDING MATERIALS
- Classified List of Materials
- Trade and Brand Names
- Suppliers and Addresses

FABRICS AND TEXTILES
- Classified List of Materials
- Suppliers and Addresses

NATURAL RUBBER AND RELATED MATERIALS
- Classified List
- Suppliers and Addresses
- Official Natural Rubber Type Descriptions

SYNTHETIC RUBBER
- Manufacturers of Synthetic Rubber
- Synthetic Rubbers by Type
- Other Rubberlike Materials by Type
- Suppliers of Butadiene and Styrene

RECLAIMED RUBBER
- Manufacturers and Addresses
- Brand Names and Trade Designations
- Classified By Application
- Classified By Color

SCRAP RUBBER AND PLASTICS
- Scrap Rubber Types
- Suppliers and Addresses

LATEX AND RELATED MATERIALS
- Latex and Latex Compounds
- Water Dispersions
- Plastisols and Organosols
- Miscellaneous
- Latex Compounding Materials
- Latex Machinery and Equipment
- Suppliers and Addresses

MISCELLANEOUS PRODUCTS AND SERVICES

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SALES AGENTS AND BRANCH OFFICES

EXPORT AGENTS

EDUCATIONAL COURSES IN RUBBER CHEMISTRY AND TECHNOLOGY

TRADE AND TECHNICAL ORGANIZATIONS

TECHNICAL JOURNALS

WHO'S WHO IN THE RUBBER INDUSTRY

SUBJECT INDEX


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.....1956

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Please send to the undersigned ..... copies of the 1955-56 RUBBER RED BOOK @ $10.00* each.

☐ Remittance of $..... is enclosed

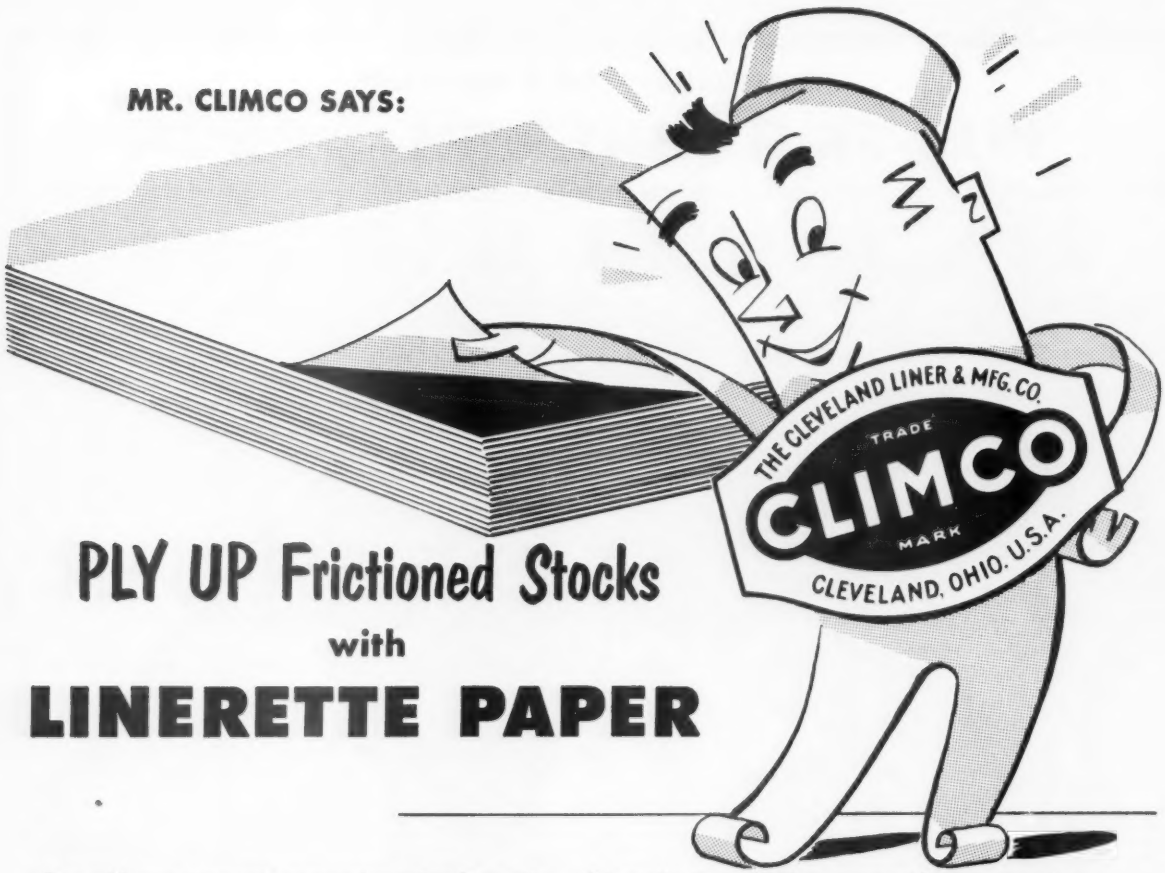
☐ Send invoice.

ADDRESS _____

NAME _____

(*) Add 3% (30c) Sales Tax for copies sent to New York City addresses.

MR. CLIMCO SAYS:




# PLY UP Frictioned Stocks with LINERETTE PAPER

You will save time and money by using Linerette separating paper to ply up frictioned stock before cutting in the clicking operation. Frictioned stock can be fed from the calender right into Linerette. This specially processed paper contains no oil or wax, prevents adhesion and insures fast, clean separation . . . leaves no cloth marks.

## OTHER LINERETTE ADVANTAGES:

- Preserves tack.
- Protects lightweight stocks in shipment—no fabric needed.
- Clippings may be mixed with scrap and worked away when used in die-cutting operations.
- Where cleanliness is essential, use Linerette as a low cost lining for trays and containers.
- Used in rolls or sheets with most types of lightweight stocks.

Linerette is available in any width up to and including 54″, in rolls of 9″, 11½″, 13″ and 15″ diameters, on cores of 3″ i. d. The yield is approximately six square yards to the pound. A 9″ roll contains approximately 375 linear yards and a 15″ diameter approximately 1150 linear yards. *Ask for a sample today, just specify desired width.*

**THE CLEVELAND LINER & MFG. CO.**
**5508 Maurice Ave. • Cleveland 27, Ohio, U. S. A.**
*Cable address: "BLUELINER"*

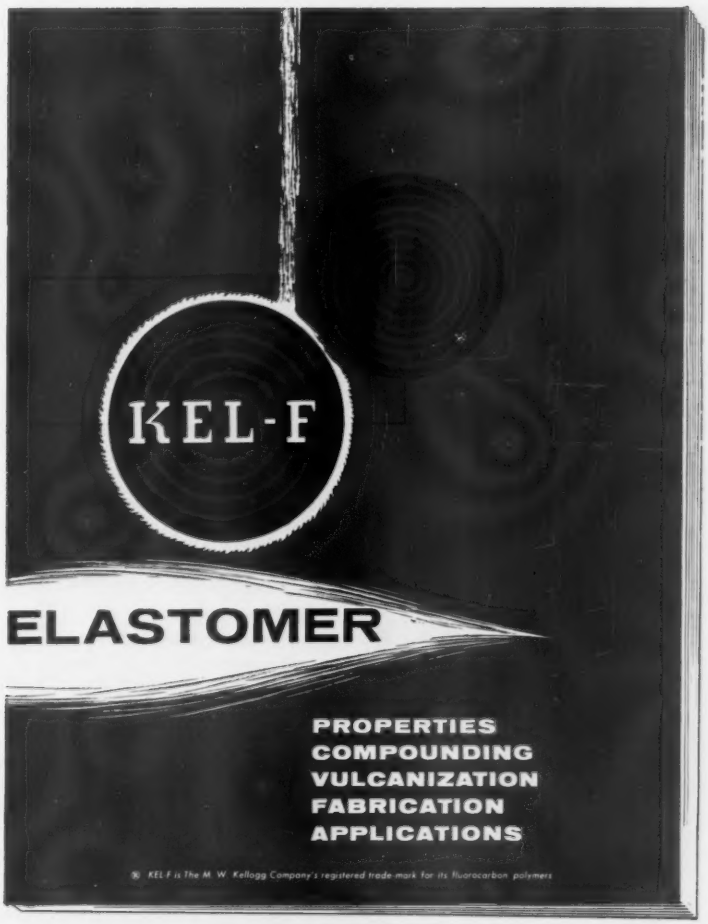
**GET THE FULL STORY ON CLIMCO PROCESSING**

Illustrated booklet tells about Climco Liners and Linerette separating paper. Tells how to get better service from liners. Write for your copy now.

**LINERETTE INTERLEAVING PAPER**
*Treatment Contains*
**NO OIL OR WAX**
*Samples on Request*

# CLIMCO
## PROCESSED LINERS
*Serving the Industry Since 1921*

PUBLICATION DATE
JANUARY, 1956




# FOR EVERYONE

**with a problem**

**in**

# RUBBER APPLICATION

KEL-F® Elastomer is a fluorocarbon rubber developed by The M. W. Kellogg Company. Possessing an unusual combination of elastomeric properties, chemical resistance, and thermal stability, KEL-F Elastomer can help solve difficult problems of rubber application under severe operating conditions. Return the coupon below to obtain a copy of this new booklet.

**THE M. W. KELLOGG CO.**

**Chemical Manufacturing Division P. O. Box 469, Jersey City, N. J.**

**SUBSIDIARY OF PULLMAN COMPANY**

Send me copy of newly published booklet "KEL-F Elastomer."

Name_____

Title_____

Company Name_____

Address_____

**THE M. W. KELLOGG CO.**

Chemical Manufacturing Division
P. O. Box 469, Jersey City, N. J.

**SUBSIDIARY OF PULLMAN COMPANY**

®Registered trademark of The M. W. Kellogg Company for its fluorocarbon polymers.

# A NEW Weather-Ometer®

*. . . for Weather Testing of Plastic and Rubber Products*

**MODEL DMC**

**Greater accuracy and reproducability achieved with new modulated temperature control.**

Accuracy in test results is greatly increased in the new DMC Weather-Ometer by a positive control of specimen temperatures.

A constant volume of air at a controlled temperature in the heavily insulated cabinet, maintains uniform predetermined specimen temperatures regardless of variations in room conditions.

Automatic control of humidities up to dew point is available as optional equipment.

All automatic controls including complete voltage controls are located on the front panel of the Weather-Ometer directly above the door of the test chamber.

Both horizontal and vertical testing is available. Shallow containers are used for semi-liquid materials and vertical panels for solid materials.

Source of radiation is two Atlas enclosed violet carbon arcs.

Complete technical information on the DMC model and other Weather-Ometers is contained in the new Weather-Ometer catalog. A copy will be mailed on request.

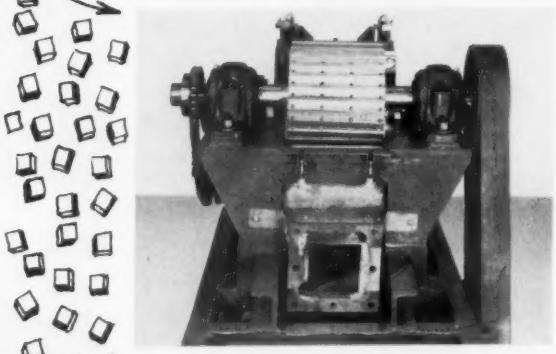
**ATLAS ELECTRIC DEVICES CO.**

**4114 N. Ravenswood Ave., Chicago 13, Illinois**

*Manufacturers of accelerated testing equipment for over a quarter of a century.*

**DICE PELLETS**

# BY THE TON



**use Taylor-Stiles No. 700 PELLETER**

This new pelleter cuts rubber and plastics extruded in rod form into evenly sized pellets without fines or longs.

The cuts are clean and free from feathers. The machines are made in two sizes, 5¾" and 10" in width.

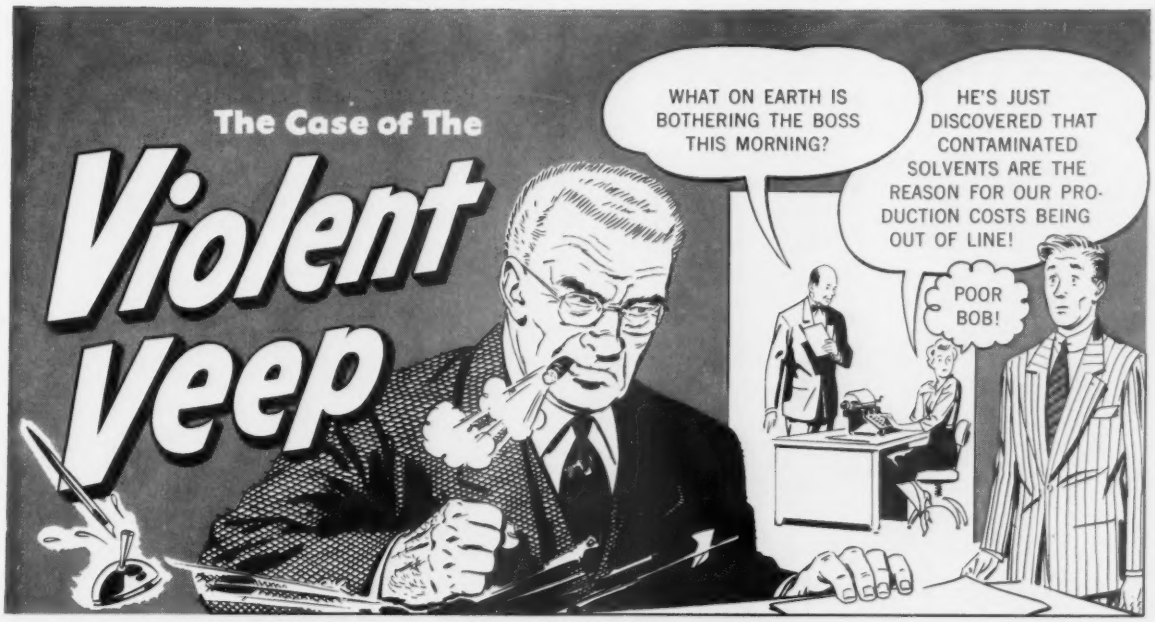
It has up to 24 fly knives and may be operated at speeds that will produce a ton of pellets an hour.

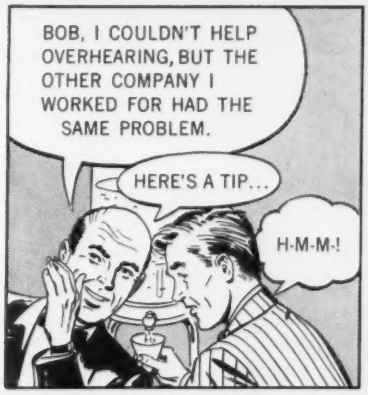
*Write for four page folder.*

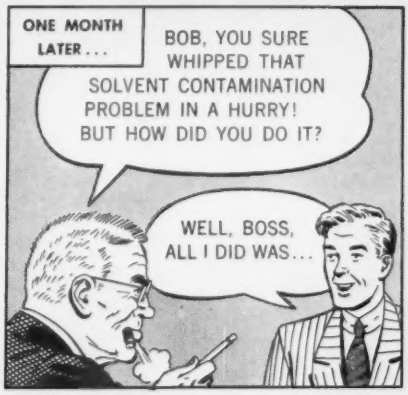
Illustrating and Describing Taylor Stiles Pelleters (for Rubber and Plastics)

**TAYLOR, STILES & COMPANY**

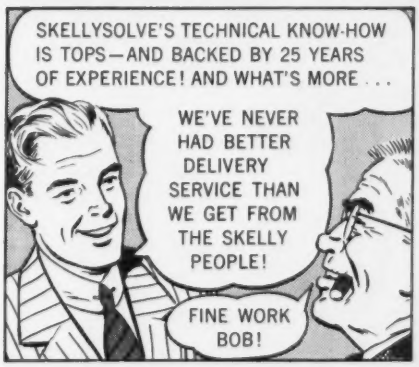
216 Bridge Street Riegelsville, New Jersey


The Case of The
Violent Veep
WHAT ON EARTH IS BOTHERING THE BOSS THIS MORNING?
HE'S JUST DISCOVERED THAT CONTAMINATED SOLVENTS ARE THE REASON FOR OUR PRODUCTION COSTS BEING OUT OF LINE!
POOR BOB!

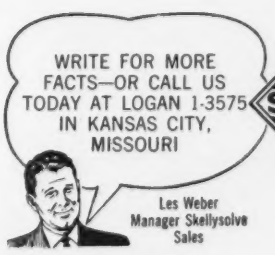




ONE MONTH LATER...
BOB, YOU SURE WHIPPED THAT SOLVENT CONTAMINATION PROBLEM IN A HURRY! BUT HOW DID YOU DO IT?
WELL, BOSS, ALL I DID WAS...

...SWITCH TO SKELLYSOLVE. IT'S NOT ONLY CONTINUALLY TESTED FOR QUALITY DURING PRODUCTION...
BUT SKELLYSOLVE IS ALSO SHIPPED IN SPECIAL TANK CARS TO ELIMINATE CHANCE OF CONTAMINATION.
AND THAT'S NOT ALL!


SKELLYSOLVE'S TECHNICAL KNOW-HOW IS TOPS—AND BACKED BY 25 YEARS OF EXPERIENCE! AND WHAT'S MORE...
WE'VE NEVER HAD BETTER DELIVERY SERVICE THAN WE GET FROM THE SKELLY PEOPLE!
FINE WORK BOB!

**Discover what** Skellysolve quality and service can mean to *your* business.




SKELLY **Skellysolve**

**SKELLY OIL COMPANY**

**Industrial Division**

**605 West 47th Street, Kansas City 41, Mo.**

## Skellysolve for Rubber and Related Industries

**APPLICATIONS**

**SKELLYSOLVE-B.** For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor in dried compound. Closed cup flash point about -25°F.

**SKELLYSOLVE-C.** For making quick-setting cements with a somewhat slower drying rate than those compounded with Skellysolve-B. Closed cup flash point about 13°F.

**SKELLYSOLVE-H.** For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about -16°F.

**SKELLYSOLVE-L.** For general manufacturing operations where a medium evaporation rate is required. Closed cup flash point about 12°F.

**SKELLYSOLVE-R.** For general use in tire building and a variety of other manufacturing operations and cements. Reduces evaporation losses. Medium quick final dry. Lessens bloating and skinning tendency. Closed cup flash point about -25°F.

Ask about our new Skelly Petroleum Insoluble Grease.

# Announcing VA-7

## . . . an economical vulcanizing agent for heat-resistant, non-blooming stocks

VA-7 is a new liquid vulcanizing agent for all types of unsaturated elastomers. It provides economical "sulfurless" cures for nitrile, GR-S and natural rubber stocks.

Stocks compounded with VA-7 display an outstanding combination of heat aging resistance . . . high tensile strengths . . . good hot compression set resistance . . . and non-blooming characteristics in the cured and uncured states.

VA-7 also offers processing advantages — it can be dispersed more easily and uniformly than sulfur. Stable emulsions for curing latices can easily be prepared from VA-7.

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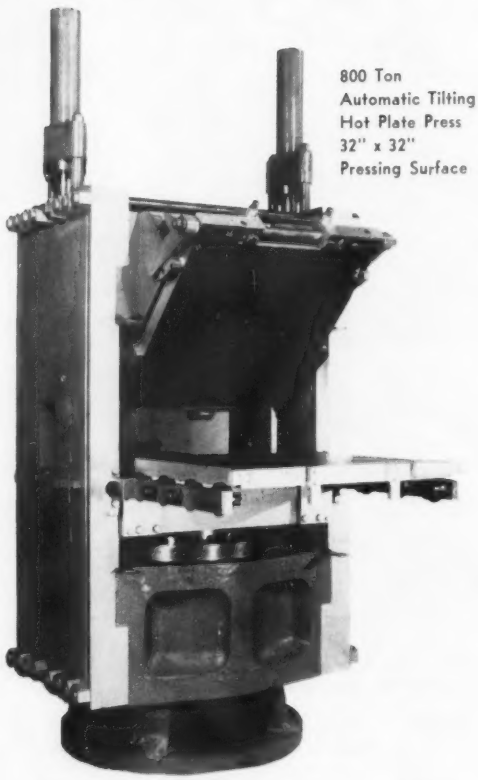

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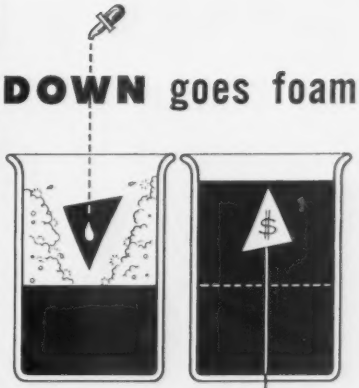


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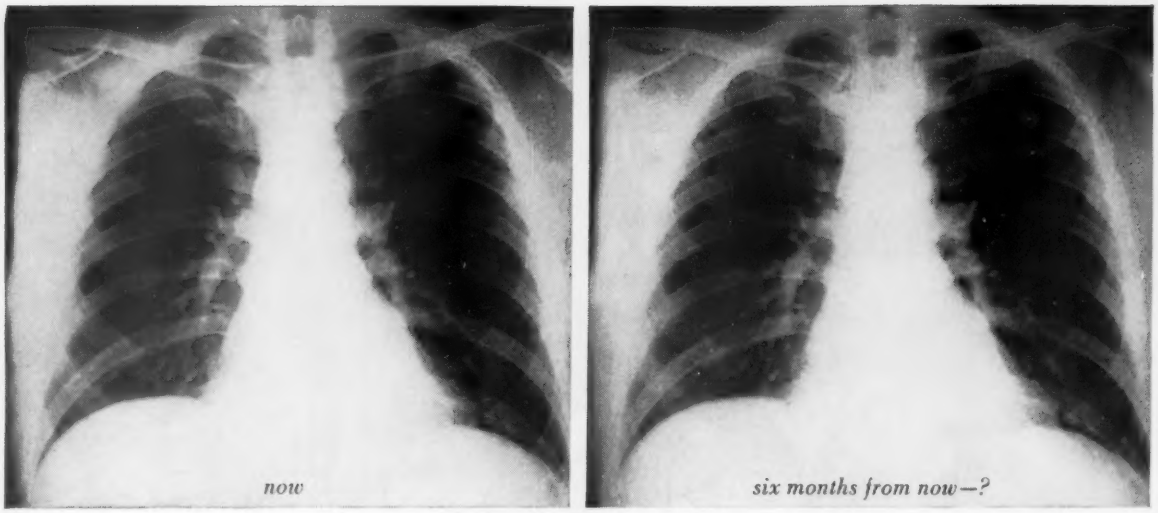


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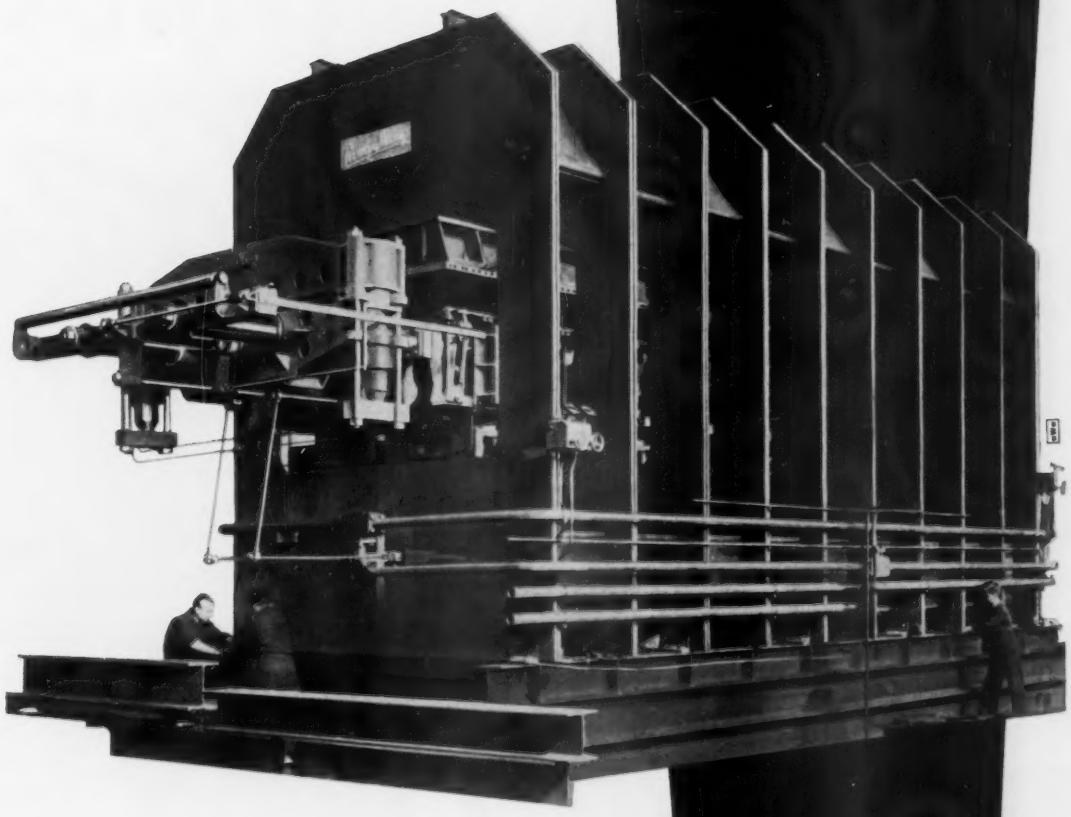

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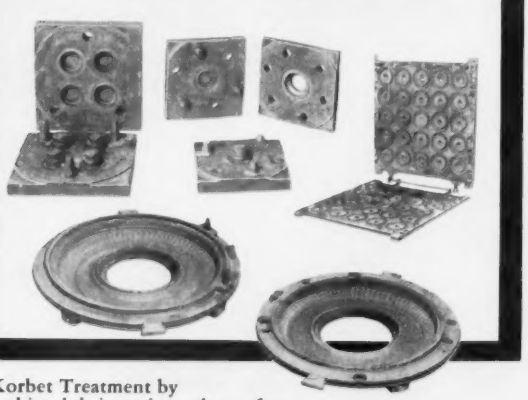

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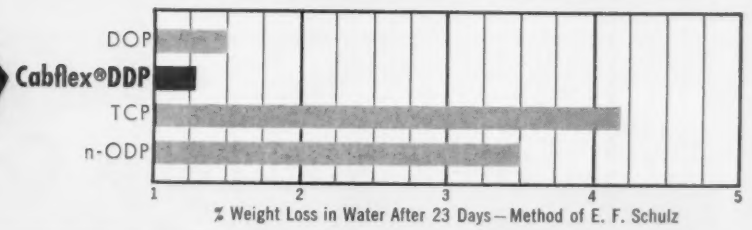


% Weight Loss in Water After 23 Days—Method of E. F. Schulz

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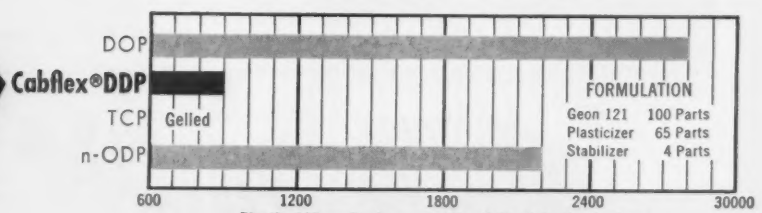


Plastisol Viscosity Increase After 4 Weeks—Centipoises

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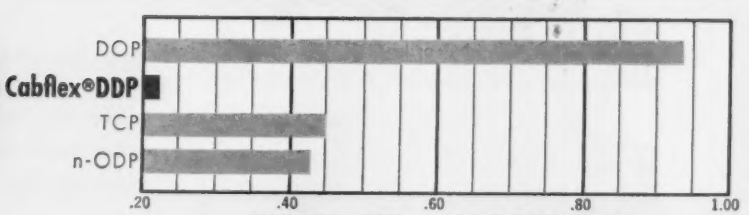


SPI Volatility—24 Hours at 70° C—Weight Loss %

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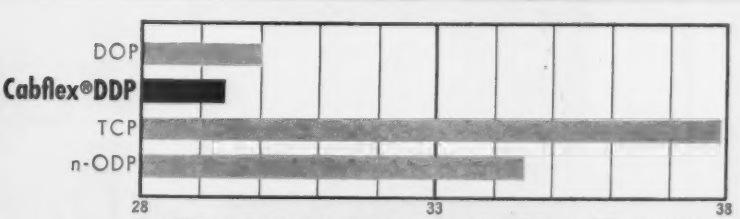


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CABFLEX®ODA (iso-octyl decyl adipate)
CABFLEX®DDA (di-decyl adipate)
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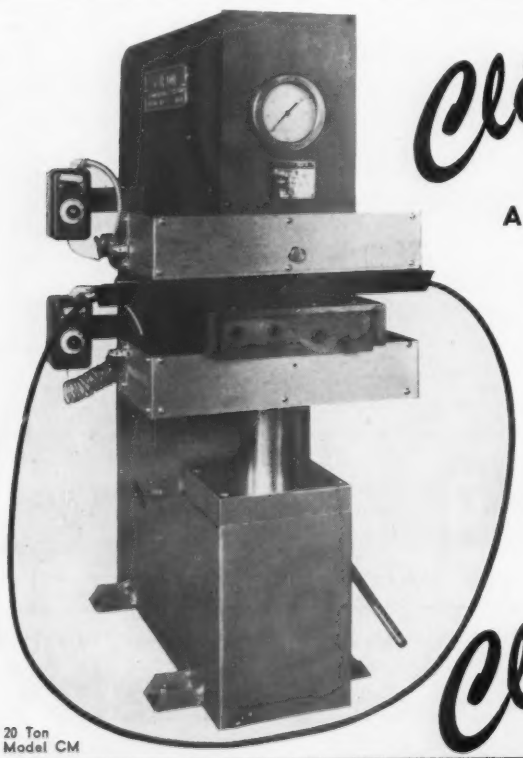

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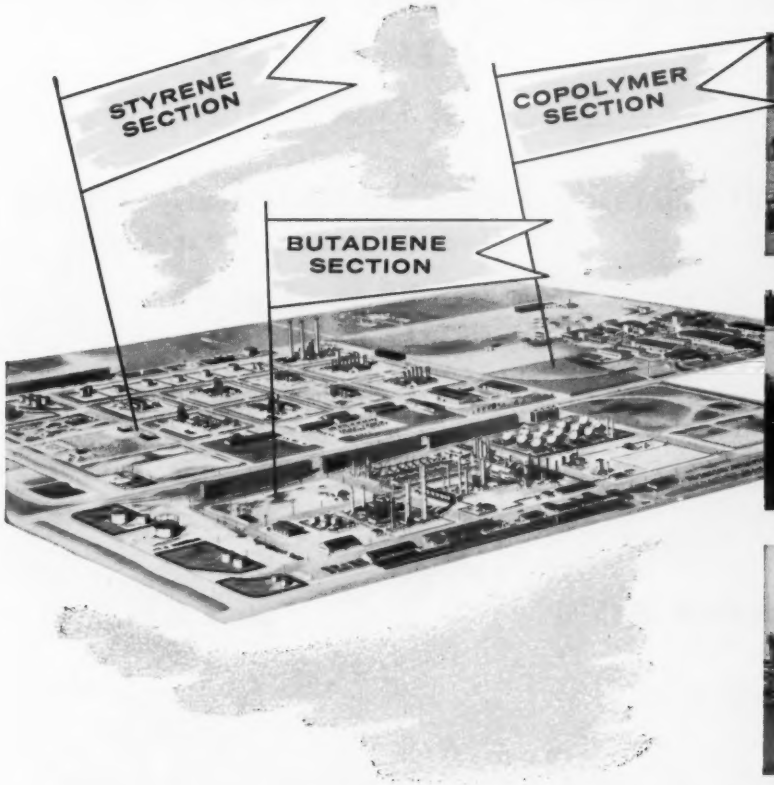

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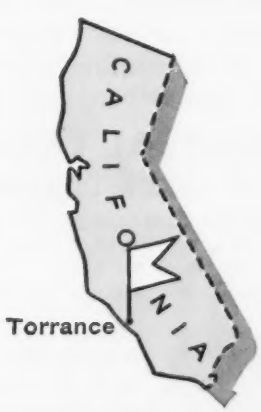


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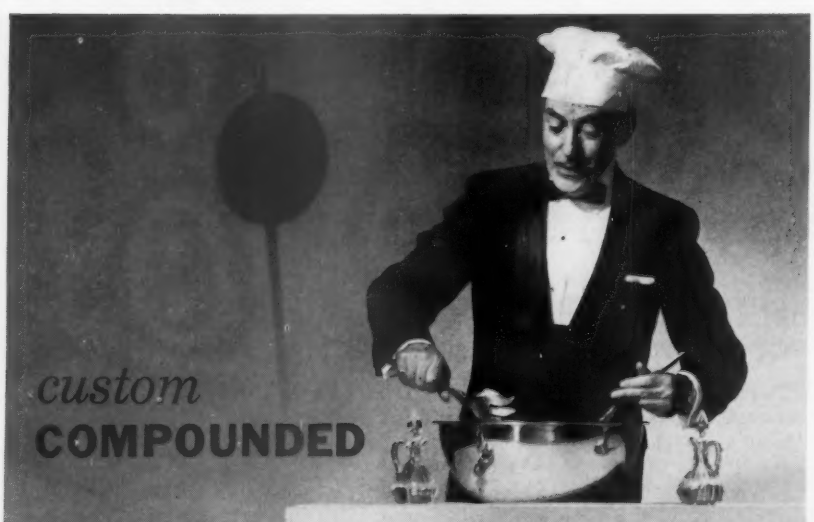

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**CADMIUM 22-V-1:** For rigid, clear and opaque stocks.
**ORGANIC 7-V-1:** Epoxy assistant.
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**BARIUM 1-V-3:** Dispersible stearate, to contribute lubricity with barium effects.
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**BARIUM 1-V-7:** Liquid, for modified plastisols and organosols.
**CALCIUM 5-V-1:** Dispersible stearate, to contribute with calcium effects.
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**ORGANIC 8-V-100:** Modified 8-V-1.

# POLYGARD chemical stabilizer for GR-S

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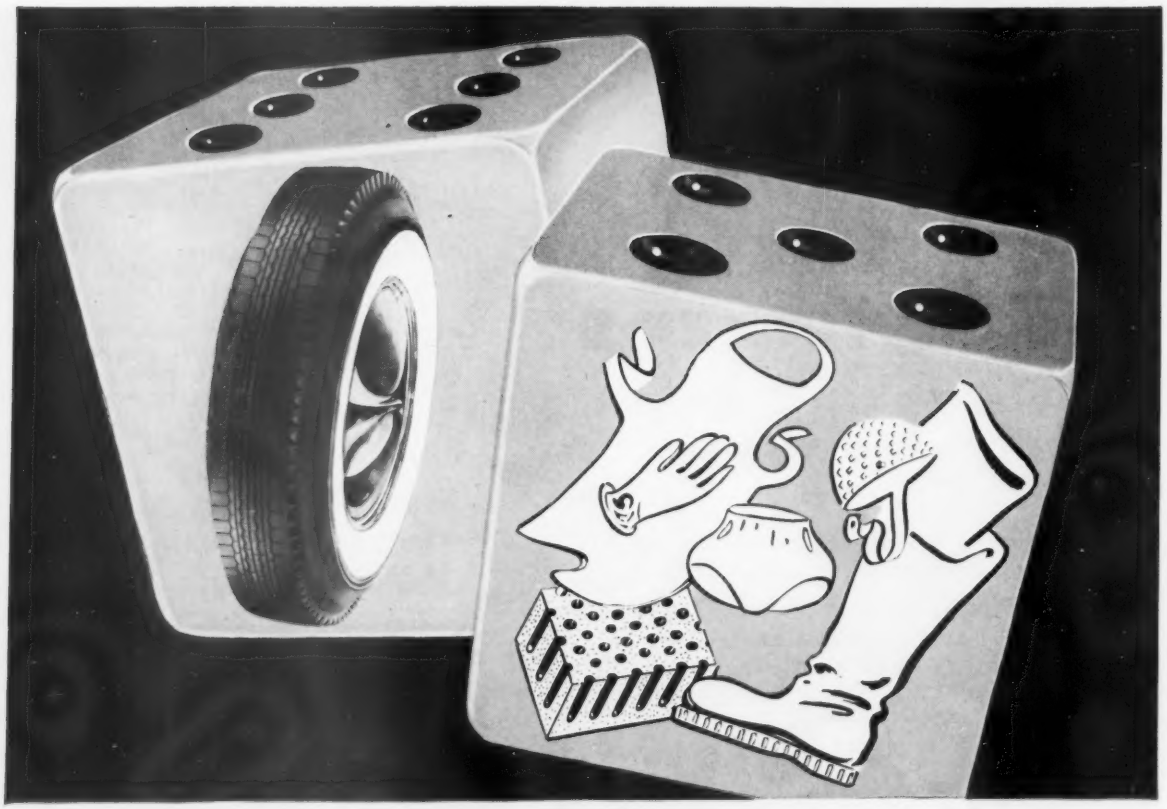

## for keeping White rubber **WHITE** • Light rubber **LIGHT**

POLYGARD® is a chemical stabilizer for *nonstaining* and *nondiscoloring* GR-S. It *keeps* light rubber light —gives *superior* color stability to your product.

Specifically designed to prevent staining and discoloring, POLYGARD gives excellent resistance to aging. It also prevents viscosity changes and gel increase during drying and high temperature processing.

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Rubber Age

Vol. 78, No. 4 JANUARY, 1956

# Temperature Coefficients of Vulcanization

By J. G. LOWENSTEIN and J. H. ROLLINS

*Chemical Corps Engineering Agency, Army Chemical Center, Maryland*

ONE important step in the development of a new rubber compound is the determination of proper cure. This normally is determined by proper selection of specific values taken from closely controlled operating conditions and procedures. Adoption of the new stock to factory production involves establishment of equivalent cures adapted to factory operating temperatures or to special time cycles of operation. The basic trial cure, subject to necessary adjustments, is currently a theoretical computation involving the use of the temperature coefficient of vulcanization for the elastomer of the compound.

For natural rubber, the basic cure is computed as required by multiplying or dividing the laboratory cure time by the coefficient of vulcanization factor (1.6 per 10°F. change in temperature) *(1)*. Similar factors have been determined for synthetics, and they have been found to vary somewhat from that of natural rubber. These values are found experimentally and a few are available in the literature *(2, 3, 4,)*. For convenience, the temperature coefficients of the most commonly used synthetic elastomers are tabulated in Table I.

The authors have found the values shown in the table for the temperature coefficient of vulcanization to be the generally accepted ones. Most of the values shown were derived by experimentation.

If equivalent cure times and temperatures for a certain formulation are known, the temperature coefficient may be determined by use of any one of equations (2) through (7), which are presented below, and can thereafter be used to determine new equivalent cures. The values in the table have been found to remain constant over the normal vulcanization range (250° to 320°F.).

It should be noted that a "curing time lag" occurs when thick articles are vulcanized. To be precise, this lag should be subtracted from the cure time before the temperature conversion is made. The time lag becomes negligible for relatively thin articles.

The mathematics of computing equivalent cures in increments of 10°F. is somewhat cumbersome and exacting in cases where temperature changes are less than 10°F. The constantly increasing application of synthetics to compounding makes it essential to have data at hand relative to their coefficients of vulcanization.

TABLE I—VALUES OF "C"

| Type of Rubber | "C" (for °F) |
|---|---|
| Natural | 1.6 |
| Nitrile (Perbunan) | 1.5 |
| Neoprene | 1.46 |
| GR-S | 1.43 |
| Nitrile (Hycar 1001) | 1.39 |
| GR-I | 1.34 |

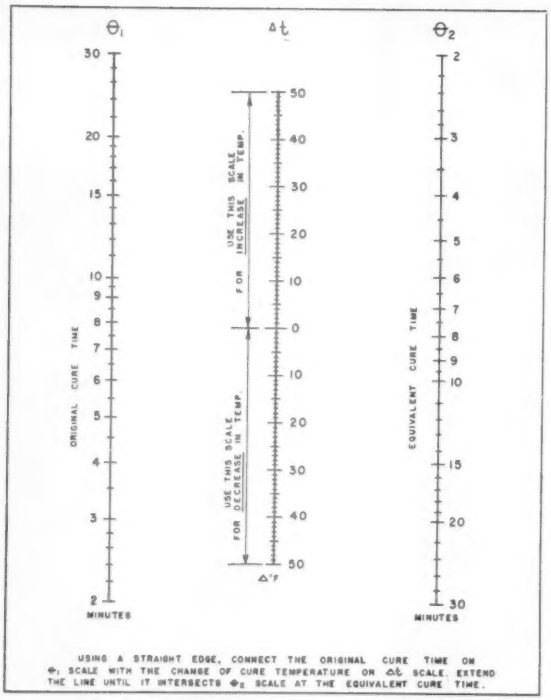

Θ1
Δt
Θ2
ORIGINAL CURE TIME
MINUTES
USE THIS SCALE FOR INCREASE IN TEMP.
USE THIS SCALE FOR DECREASE IN TEMP.
Δ°F
EQUIVALENT CURE TIME
MINUTES
USING A STRAIGHT EDGE, CONNECT THE ORIGINAL CURE TIME ON Θ1 SCALE WITH THE CHANGE OF CURE TEMPERATURE ON Δt SCALE. EXTEND THE LINE UNTIL IT INTERSECTS Θ2 SCALE AT THE EQUIVALENT CURE TIME.

*FIG. 1—Nomograph for the determination of equivalent cures for natural rubber.*

It appears desirable that simple procedures for computing equivalent cures be made available in the literature.

It is the purpose of this paper to present an easily manipulated rotary or chart-type nomographic aid for the calculation of equivalent cures for use with natural rubber and with most common synthetic elastomers. The presentation will include the theoretical development of the mathematical bases of the aids and describe the procedures for use of the aids in the computation of equivalent cures.

## Calculations and Equations

The temperature coefficient of vulcanization, C, is used as a constant (for any one type of rubber) in the determination of a new cure time when there is a change of cure temperature. As commonly used, the coefficient represents that factor by which the cure time must be multiplied for a 10°F. drop in cure temperature, or, conversely, that factor by which cure time must be divided for a 10°F. rise in cure temperature:

$$t - 10^\circ \sim C \cdot \Theta_1$$

or its analog:

$$t + 10^\circ \sim \Theta / C$$

However, as stated above, 10 degree increments in change of cure temperature are often inconvenient to apply. Therefore, it is of interest to calculate cure-time change for *any* temperature difference, $\triangle t$.

For a 10 degree change

$$\Theta_2 \sim \Theta_1 \cdot C$$

which can be expressed as

$$\Theta_2 = \Theta_1 \cdot C^{-1} \qquad (1)$$

### Explanation of Symbols Used

- C = Temperature coefficient of vulcanization.
- $C_{°F}$ = Temperature coefficient of vulcanization for use with °F.
- $C_{°C}$ = Temperature coefficient of vulcanization for use with °C.
- T = Time factor ($= \Theta_2/\Theta_1$).
- t = Cure temperature, °F.
- $\Delta t$ = Temperature difference.
- $\Theta_1$ = Cure time (original).
- $\Theta_2$ = Cure time (equivalent or new).

The exponent "1" to which C is raised is recognized as the value

$$\frac{\Delta t}{10},$$

which for a 10 degree change equals 1. The minus sign of the exponent mathematically corrects for the fact that as temperature is increased, cure time decreases, and conversely as the cure temperature decreases, the equivalent cure time is increased.

The general relationship, then, can be expressed as

$$\Theta_2 = \Theta_1 \cdot C^{\left(-\frac{\Delta t}{10}\right)} \qquad (2)$$

It will be found that this equation is true for all temperature differences. For calculating purposes, a temperature increase will be termed positive, while a temperature decrease will be negative.

Figure 1 is a nomograph based on equation (2). This

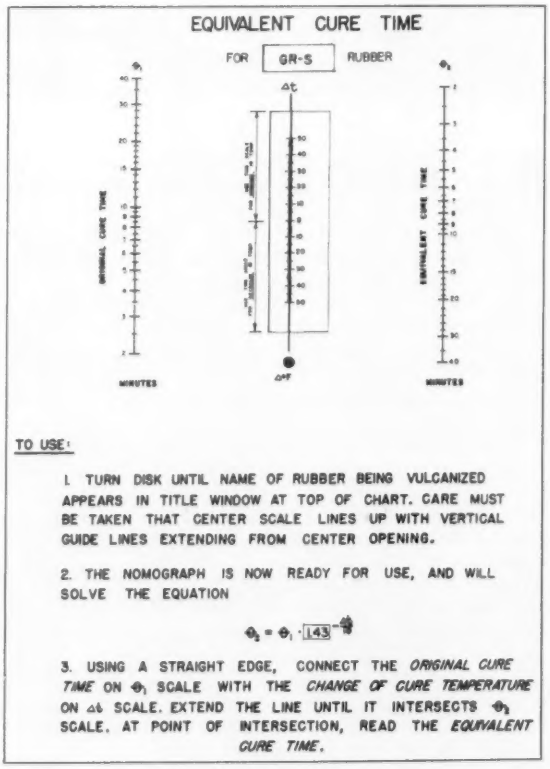
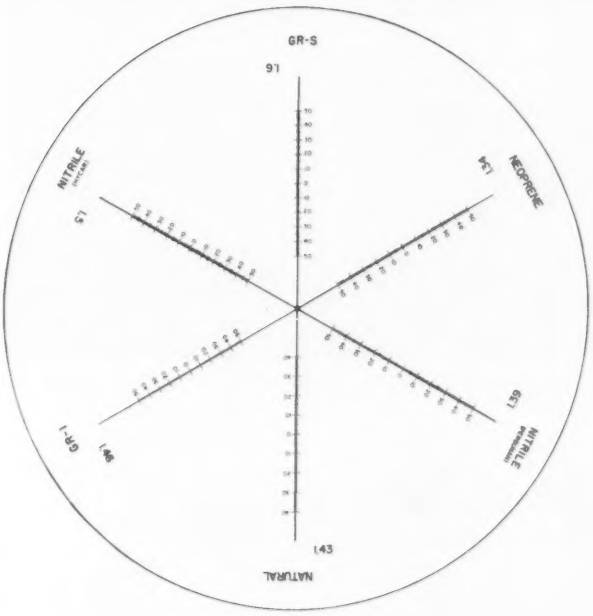

EQUIVALENT CURE TIME
FOR GR-S RUBBER
Δt
MINUTES
MINUTES
TO USE:
1. TURN DISK UNTIL NAME OF RUBBER BEING VULCANIZED APPEARS IN TITLE WINDOW AT TOP OF CHART. CARE MUST BE TAKEN THAT CENTER SCALE LINES UP WITH VERTICAL GUIDE LINES EXTENDING FROM CENTER OPENING.
2. THE NOMOGRAPH IS NOW READY FOR USE, AND WILL SOLVE THE EQUATION
3. USING A STRAIGHT EDGE, CONNECT THE ORIGINAL CURE TIME ON Θ1 SCALE WITH THE CHANGE OF CURE TEMPERATURE ON Δt SCALE. EXTEND THE LINE UNTIL IT INTERSECTS Θ2 SCALE, AT POINT OF INTERSECTION, READ THE EQUIVALENT CURE TIME.

*FIG. 2—Equivalent cure computer.*



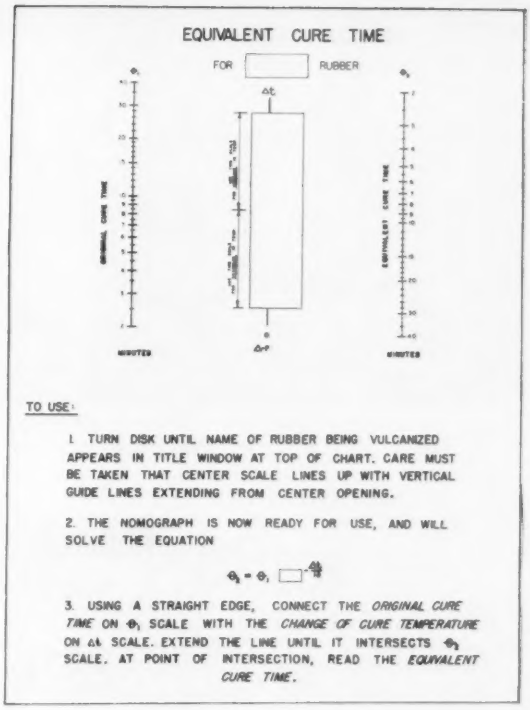


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*FIG. 3—Individual components of equivalent cure computer.*

illustration is for natural rubber only, based on a temperature coefficient of vulcanization of 1.6. In general, synthetic rubbers have temperature coefficients of vulcanization which, in most cases, differ from that of natural rubber (see Table I). These coefficients may be used as the bases for additional nomographs, each applicable to a specific synthetic rubber.

The chart shown in Figure 1 can be modified to consolidate specific parts of the "Equivalent Cure" nomographs of the major types of synthetic rubber and natural rubber to make up a calculating device similar to that shown in Figure 2. By simple manipulation, the proper center scale may be aligned for use in computing applicable equivalent cures. The two components of this slide rule are reproduced in Figure 3; they may be cut out and suitably joined at the center to make a small working model.

A second computing device, an alignment chart equal in value to the one described above, may be based on the following modification of equation (2):

A more general expression may be obtained by dividing both sides of equation (2) by $\theta_1$. The equation then becomes

$$\frac{\theta_2}{\theta_1} = C^{\left(-\frac{\Delta t}{10}\right)} \qquad (3)$$

The function $\theta_2/\theta_1$ is the time factor, T, which is used as a multiplier:

$$T = C^{\left(-\frac{\Delta t}{10}\right)} \qquad (4)$$

or

$$T = C^{-0.1\,\Delta t} \qquad (5)$$

The exponential minus sign (—) may be omitted for a more general equation

$$T = C^{0.1\,\Delta t} \qquad (6)$$

as long as it is realized that cure time must be divided by

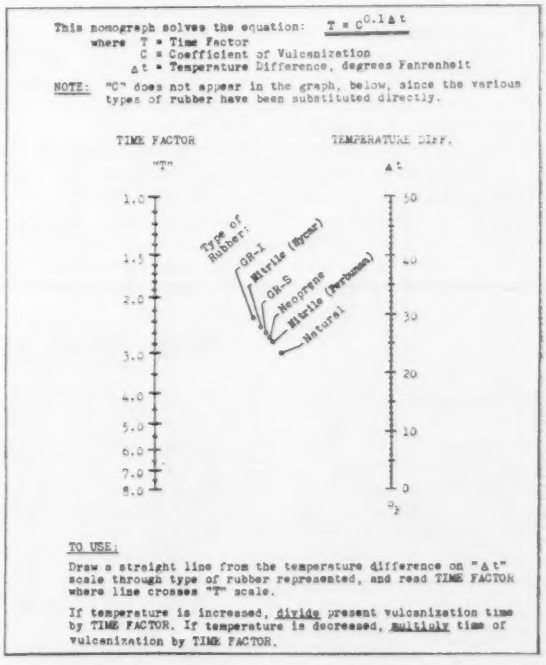

This nomograph solves the equation: T = C^0.1Δt
where T = Time Factor
C = Coefficient of Vulcanization
Δt = Temperature Difference, degrees Fahrenheit
NOTE: "C" does not appear in the graph, below, since the various types of rubber have been substituted directly.
TIME FACTOR
"T"
TEMPERATURE DIFF.
Δt
Type of Rubber:
GR-I
Nitrile (Hycar)
GR-S
Neoprene
Nitrile (Perbunan)
Natural
TO USE:
Draw a straight line from the temperature difference on "Δt" scale through type of rubber represented, and read TIME FACTOR where line crosses "T" scale.
If temperature is increased, divide present vulcanization time by TIME FACTOR. If temperature is decreased, multiply time of vulcanization by TIME FACTOR.

*FIG. 4 — Nomograph for the determination of equivalent cures for synthetic elastomers.*

T for increases in temperature, and multipled by T for decreases in temperature.

To use equation (6) to find a given temperature difference for a known increase or decrease in cure time (new T), it is seen that

$$C = \sqrt[0.1\,\Delta t]{T} \qquad (7)$$

A simple alignment chart for the evaluation of equations (6) and (7) is presented in Figure 4. It is to be noted that the function "C" does not appear on the chart. Instead, the names of the various types of rubber were directly substituted for their respective temperature coefficients of vulcanization. (If desired, a straight logarithmic scale may be re-substituted for greater flexibility).

Other types of nomographs may be made up from the various equations, such as a 4-scale chart combining $\theta_1$, $\theta_2$, C, and $\Delta t$, or the lattice nomograph suggested by Foitik *(5)* for handling all variables, but these charts become quite complicated in that they necessitate turning lines and/or more than one alignment. It has been the aim of this paper to make the charts as simple as possible to forego any chance of error in manipulation.

(Some publications, especially European ones, give values for the temperature coefficient of vulcanization to correspond with temperature in degrees Centigrade. To make these coefficients conform to American usage, they can be converted for use with degrees Fahrenheit as follows:

$$C_{°C} = C_{°F}^{1.8} \qquad (8)$$

and

$$C_{°F} = \sqrt[1.8]{C_{°C}} \qquad (9)$$

This conversion does not affect the use of any of the foregoing relationships as long as the temperature difference and temperature coefficient are in compatible units.)

# Appendix—Use of Charts

The following example will illustrate the use of the charts described in the foregoing paper:

It is desired to cure natural rubber in a curing oven which operates at 185°F. Laboratory data indicates that this particular sample has an optimum cure time of 5 minutes at 200°F. What will the optimum cure time be at 185°F.?

Solution:

Original cure time ($\theta_1$) = 5 min.

Change in temperature ($\Delta t$) = —15°F.

(a) Using Figure 1—Align 5 minutes on the $\theta_1$ scale with 15° on the lower half of the $\Delta t$ scale. On $\theta_2$ scale read the new cure time as 10 minutes.

(b) Using Figure 3—After cutting out components of computer, cutting out openings, and assembling both parts, turn the circular slide until the word "NATURAL" appears in the title opening. Line up center scale and use as above. Using computer, new cure time is found to be 10 minutes.

(c) Using Figure 4—Align 15° on the $\Delta t$ scale with the point representing Natural Rubber. On scale "T", read 2.0 where this line cuts axis. Since $T = \theta_2/\theta_1$, $\theta_2 = T \cdot \theta_1$, and $\theta_2 = (2{\cdot}0)\ (5) = 10$ minutes for new cure time.

(d) By mathematical calculation—

$$\theta_2 = \theta_1 \cdot C^{-\frac{\Delta t}{10}}$$

Substituting values for $\theta_1$ and $\Delta t$, and using C = 1.6 (for natural rubber):

$$\theta_2 = (5)\ (1.6)^{1.5}$$

$$\theta_2 = 10.1 \text{ minutes}$$

The error resulting from use of the charts is therefore 1.0%. This represents only a six second error in the total cure time, a deviation which can be considered negligible.

LITERATURE REFERENCES


(1) Stanco Distributors, Inc., "Synthetic Rubber Technical Data," 1943.

(2) Shearer, Juve and Musch, *India Rubber World*, Vol. 117, pp. 216-19 (1947).

(3) Morris, Hollister and Mallard, *Ind. Eng. Chem.*, Vol. 36, pp. 649-53 (1944).

(4) Cheyney and Duncan, *Ind. Eng. Chem.*, Vol. 36, pp. 33-36 (1944).

(5) Foitik, *Gummi-Zeitung*, Vol. 52, pp. 517-19 (1938).


# Proper Method for Wrapping Rubber Hose

AN operation which has sometimes caused serious injuries is the cross wrapping of rubber hose with cotton tape. The following suggested method, taken from a recent issue of the *Safety News Letter* issued by the Rubber Section of the National Safety Council, is based on studies of this operation made by several safety directors:

On small diameters the job is sometimes done in a three-roll wrapping machine. On larger diameter mandrels it is done on a machine similar to a lathe, which is equipped with snubbing bars.

The tape is started around the mandrel by hand, before the power is started, and the diameter is built up before starting to cross wrap. After the power is started, both hands of the operator are placed on the spool holding the wrapper, thereby keeping them out of the danger zone.

After cross wrapping the diameter is built up at the other end of the sleeve. The fabric is not given a half twist upon coming to the end of the hose, but is spiraled out and spiraled back the full length of the hose. The machine is stopped when smoothing down or twisting the fabric.

After wrapping of the hose is finished the wrapper is allowed to hang loose. It does not unwrap or unwind more than a turn or two, provided the wrapper is soaking wet.

*General view of the Huntington, West Virginia, plant of American Container Corporation.*

# How American Container Produces Battery Cases

WHAT electric power is to America's stationary industry, the storage battery is to modern transportation. If you ride in an automobile or truck, Pullman or plane, subway or submarine, you owe a debt to batteries.

Tucked away on a side street in the outskirts of Huntington, W. Va., is a firm which plays a big part in this country's battery production—the American Container Corporation. The modern production lines of this eight-year-old plant turn out 10,000 rubber battery cases daily, ranging in size from about 10 inches long to nearly as tall as a man. Volume is now nearly 45 per cent above the maximum projected when the plant opened, and four times the original daily output of 2,500 battery cases.

## Selection of Plant Site

The story of American Container's move to Huntington in 1947 and its success there is typical of a labor-seeking pattern that has developed in many types of industrial operations since World War II. As a wholly-owned subsidiary of Gould-National Batteries, Inc., American Container had two plants, one at Depew, N. Y., and one at Rock Island, Ill. Both plants were in intensely competitive labor markets, especially Depew which is very close to Buffalo.

Management started a search for a new plant location that would offer economical shipping to a number of Gould-National factories, a large pool of available labor, moderate climate, and a receptive community.

P. J. Carlsen, former vice-president of the company, sent out a number of inquiries about favorable places in which to locate a new plant at the same time the company attorney was compiling statistics on tax rates and labor pools. One of the most detailed objective reports on the seven-state area in which American Container was most interested was available from the Area Development Department of the American Gas & Electric Company in New York City. This up-to-the-minute information covers 2,319 communities in Michigan, Indiana, Ohio, Kentucky, West Virginia, and Tennessee, and has enabled a great many plants to solve their plant location preliminaries.

Huntington seemed to offer a happy combination of desirable factors. It was as far south as the company wanted to go with its steam-heated presses and yet far enough south to reduce snow and heating problems during the winter months. There was a large labor pool; taxes were moderate; rail, truck and water transportation were available; there was a dependable supply of low cost electric power; natural gas and coal were available to heat the giant presses. When the Huntington Chamber of Commerce reported that an industrial building more than 50 percent completed could be purchased at a reasonable price, American Container jumped at the opportunity.

The company found it pleasant to be able to send out a work call and then pick and choose from among the hundreds of applicants. They also found that although there were few workers skilled in battery-making trades, the people of the area were eager to learn and showed judgment and initiative on the job.

## Preliminary Production Steps

About the time American Container moved into the Huntington building it shifted production from the war-time composition cases to hard rubber products. With compounds made to specifications for various uses, natural and synthetic rubber constitute the basic materials for battery cases.

On its present production schedule of 10,000 cases a day, the plant uses 140,000 pounds of synthetic rubber and 20,000 pounds of natural rubber a month. This is mixed with about 500,000 pounds of reclaimed rub-

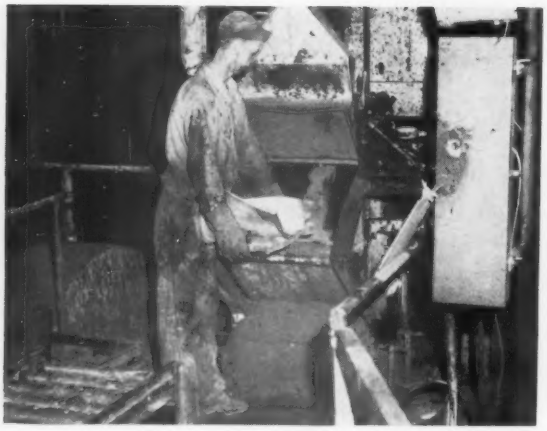


*FIG. 1—Loading of the Banbury at American Container's Huntington plant. The mixed material is conveyed from the bottom opening to a mill.*

ber, 410,000 pounds of anthracite coal, 30,000 pounds of sulfur, and vast quantities of various kinds of oils.

Battery cases are designed by company engineers in cooperation with the production and sales departments along with customer representatives. Following the approved design, orders are placed for molding equipment through the machine shop.

As soon as the container is designed the company's Research and Development Division starts work on developing proper compounds to meet specifications and at the same time be satisfactory from a production standpoint. If the job is entirely new the Research and Engineering Division continue their work on the actual mold when it is received and make sure it and the formula are perfect before turning them over to the production department. Research in turn will have advised purchasing of any special materials required so that these will be on hand as needed.

All raw materials are ordered in C/L or T/L quantities and sampled when received, then stored for use in production. Weekly physical inventories are taken in an effort to keep materials scheduled in on a regular basis. If raw materials are not shipped on pallets they are palletized at the car as they are unloaded. Fork lift trucks of the electric type powered with Gould-National batteries are used exclusively to handle this movement of raw material from car to storage to processing.

## Production of Battery Cases

The first actual production step in manufacturing a hard rubber case is the compounding operation where various rubbers, fillers, accelerators, curing agents, processing and lubricating oils are weighed up according to pre-developed formulae. These weighed materials are transferred in containers via conveyors to the Banbury (Figure 1). The Banburys are placed in a pit due to the one floor building structure and the mixed material is conveyed from the bottom opening by means of an elevator to the mills (Figure 2) where it is sheeted off to the desired thickness.

Banbury and mill cycles are approximately the same, time variation depending on the type of compound being produced. Aprons are used on the mills to keep the rubber on the rolls. Proper temperatures must be maintained at both pieces of mixing equipment which is done by the use of cool water. Mixing times are closely controlled through a system of timers and signal lights.

The mixed material is cut off the mill and transferred to an automatic cutter via another conveyor where it is cut by machine to the size required. The cut slabs, usually near the size of the area of the bottom of the case to be molded, are accumulated in a flat bed truck (Figure 3). The material is labeled and sampled and then transferred to the weigh stations.

All weighing is done on a counter-balanced shadow graph type of scale so that each weigh pan is weighed to the same point on the scale. One weigh station handles a multiple number of weigh pans required for a multiple number of presses. Each press usually molds two cases at a time and each cavity of the press is assigned its own weigh pan. The weigh pans have false bottoms with ballast so that proper weights can be obtained regardless of the size of case to be molded. The filled weigh pans are transferred to the presses by means of a power conveyor and the empty pans are returned to the weigh station by the same means.

*FIG. 2—After being mixed on the Banbury, rubber is sheeted off to the desired thickness on mills as shown above.*

*FIG. 3—After milling, the material is cut to size then weighed on a counter-balanced shadow graph type of scale.*

Hydraulic compression type presses (Figure 4), are used to mold the cases. Dies used in these presses are chrome plated to assure perfect finish. Each press is heated to the desired temperature, usually with steam, and even temperature must be maintained through automatic controls. Electric timers are used to insure proper cure times. Molded cases are placed on other power conveyors and carried to the trimming operation (Figure 5). Trimming is done, while the box is hot, by hand with a straight bladed knife especially sharpened for this purpose. Trimming cuts off all the flash resulting from the joint lines of the mold.

## Methods of Quality Control

Conveyors are used to carry the boxes from the trim station to the cooling operation (Figure 6). Cases are usually water or air cooled and when water cooled a shrink form is usually used on the top of the case to keep the product from warping out of shape. This is an important operation.

Following the cooling operation the cases are given a visual inspection as well as a dielectric test to check for imperfections, appearance, and holes. The dielectric test consists of placing specially designed equipment charged with separate poles of high voltage on opposite sides of each wall and partitions of the case in such a manner that curent will cross from one pole to the other through any hole present.

Cases are again moved via powered conveyors to their respective storage areas. As orders are received and production made the cases are shipped accordingly in truck and carload quantities. Cases are either loaded out palletized or in bulk with a specially developed method of packing.

Regular laboratory tests are run on the various type cases. These tests include acid and chemical analysis, impact, bulge, tensile and elongation, plus special checks for cases designed for unusual uses. These tests are a means of controlling the quality of the product and insures the customer that he is getting quality desired.

Only the cases are manufactured at the Huntington plant. Most of these then go to 22 other Gould-National Batteries, Inc., plants where the "works" are installed and the batteries made ready for market. Workers at the Huntington plant take pride in the fact that battery cases for the atomic-powered submarine Nautilus came from their production lines.

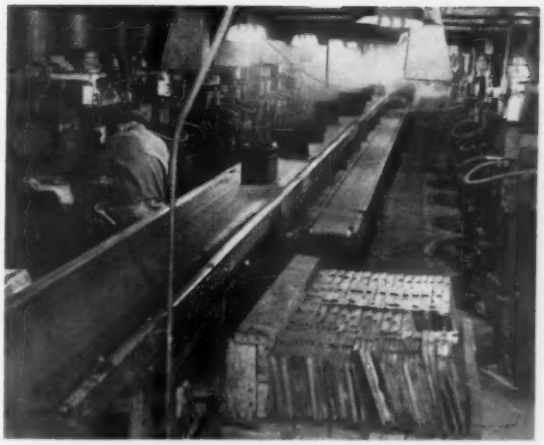


*FIG. 4—View showing the press line where each press usually molds two cases at a time. Each cavity is assigned its own weigh pan.*

American Container has become a valued member of Huntington's industrial community. In addition to its $700,000 annual payroll the plant makes a practice of favoring the area in which it lives when it comes to buying materials and outside services as are necessary to the operation of the plant.

## Plant Management

The team which guides this operation includes A. H. Daggett of St. Paul, Minn., chairman of the board of American Container Corp.; H. J. McKay, St. Paul, president; D. L. Ball, Huntington, vice-president in charge of engineering and production; J. P. Taylor, factory manager, and W. F. Nelson, director of research and engineering.

"We feel that the care with which management selected the location for this plant has played an important part in its healthy growth and bright prospects. Our progress can be judged from the fact that we have grown from the fourth to the number one supplier of rubber for our parent company since we got into full production here in Huntington," Mr. Taylor and Mr. Ball agree.

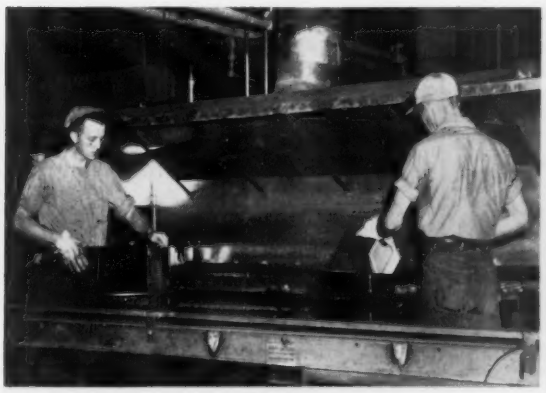


*FIG. 5—Trimming is done by hand while the box is hot. Trimming cuts off all the flash resulting from the joint lines of the mold.*

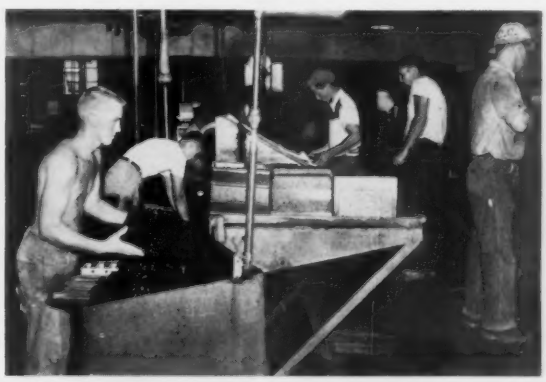


*FIG. 6—The cases are usually water or air cooled. When water cooled a shrink form is used to keep the case from warping out of shape.*

# A Simple Direct Method for Measuring the Permeability of Rubber Vulcanizates to Gases

By D. C. EDWARDS

*Research and Development Division, Polymer Corporation Limited, Sarnia, Ontario, Canada*

**A simple means for measuring the permeability of vulcanizates to air and other gases is described. Positive gas pressure is applied to one side of the specimen, which consists of a thin vulcanized sheet mounted in a simple cell. The gas permeating the specimen displaces liquid from a graduated capillary tube, permitting a direct measurement of the volume. Since the passage of only about 0.1 cm. of gas is sufficient to establish the permeability with a suitable degree of accuracy, the method is relatively rapid. It requires only a minimum of equipment or skill.**

IN the evaluation of special purpose rubber compounds it is sometimes necessary to determine the permeability of the vulcanizates to air or other gases. Methods described in the literature are often unduly time consuming, and in many cases require the purchase or construction of relatively complex equipment. The present method was developed primarily for the purpose of measuring the permeability of inner tube compounds to air; however, other gases may be used if desired. Values are normally obtained in less than ninety minutes for measurements made at 65°C., and are sufficiently accurate for any practical purpose.

## Apparatus

A diagram of the apparatus is shown in Figure 1. The permeability cell (1) consists of two circular plates. The upper plate is ½-inch thick and 5¼ inches in diameter, with a ⅜-inch copper tube silver-soldered into an opening in the center to serve as the inlet line. A rubber gasket (3) is cemented to the lower surface of the plate.

The lower plate is ¾-inch thick and 5¼ inches in diameter, and contains a cylindrical cavity in the center having a depth of ½ inch and a diameter of 3 inches. A drilled ⅛-inch hole runs horizontally from the bottom of the cavity to the exterior of the cell. A 1/16-inch I. D. copper tube, fitting into this hole, silver-soldered at the exterior surface, serves as the exit line. Resting in the cavity is a perforated cylindrical metal piece 2-15/16 inches in diameter and 15/32-inch in thickness. This is held slightly off the bottom of the cavity by four short legs. A number of 1/16-inch holes drilled

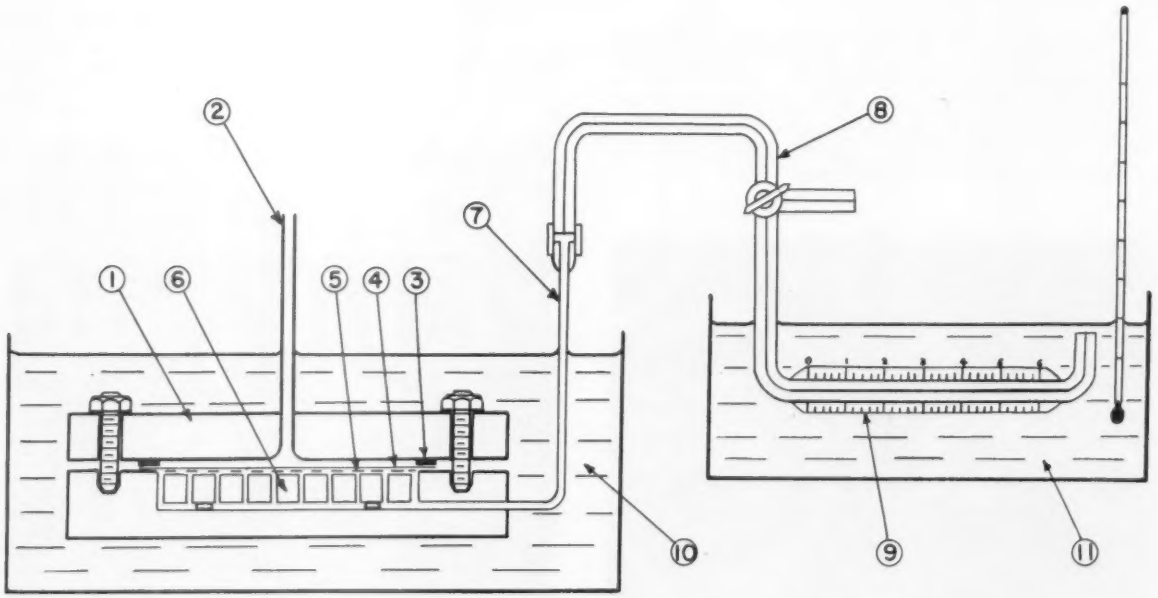



*FIG. 1—Schematic drawing of permeability test assembly.*

**(1) Permeability cell, (2) Gas inlet line, (3) Rubber gasket, (4) Test specimen, (5) Filter paper, (6) Perforated cylindrical aluminum support, (7) Gas exit line, (8) Glass capillary tube, (9) Graduated glass scale, (10) Thermostatically-controlled water bath, (11) Carbitol solvent bath.**

through this block facilitate the passage of gas from the membrane to the exit line.

The two plates forming the cell are held together by four ⅜-inch bolts. During a test, the cell is immersed in a water bath thermostatically-controlled to within ±0.2°C. of the desired temperature. The temperature of the cell is observed by means of a mercury thermometer. The bulb of the thermometer is accommodated by a ¼-inch hole drilled through the upper plate of the cell.

The exit line of the cell is connected by means of a short length of Tygon tubing to the volume measuring device. This consists of a length of 2 x 7.8 mm. glass capillary tubing containing a three-way stopcock as shown (8). The lower horizontal portion of the capillary, which is about 4 inches long, is graduated. In the present apparatus the graduations were introduced by slipping a portion of a Pyrex burette over the capillary tube and sealing at both ends. The graduations may be calibrated by sucking mercury into the tube, measuring the length of the mercury column, then removing and weighing the mercury.

Beyond the graduated scale, the end of the capillary tube is bent upwards at right angles. The opening is 1⅛ inches above the graduated portion of the capillary. During a test, the graduated capillary is immersed in a bath of liquid, the turned-up end of the capillary being placed just beneath the surface of the liquid. The liquid should be of low viscosity and vapor pressure, and should have a low solvent power for the gas in question. In the case of air permeability measurements, Carbitol solvent (diethylene glycol monoethyl ether) is a suitable choice. The liquid should be saturated with the gas in question prior to the test. A view of the assembled tester is shown in Figure 1A.

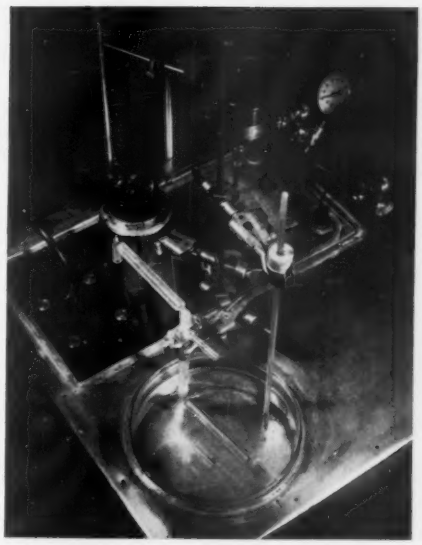


*FIG. 1A—View of permeability tester.*

## Procedure

*Preparation of Specimens:* The test specimen consists of a circular sheet 3¾ inches in diameter and preferably 0.01 to 0.03 inch in thickness. Vulcanized rubber samples are readily prepared by sheeting the compounded stock to a thickness of about 0.02 inch, placing the sheet in a mold 6 inches x 6 inches x .015 inch, and press curing in the conventional manner. The thickness of the specimen is determined by means of a thickness gauge. Five readings are taken. The effective thickness, d, of the specimen is obtained by

$$\frac{1}{d} = \frac{1}{5}\left(\frac{1}{d_1} + \frac{1}{d_2} \cdot \cdot \cdot + \frac{1}{d_5}\right)$$

*Test Procedure:* Three 3-inch discs of Whatman No. 1 filter paper are placed on top of the perforated metal piece in the lower half of the permeability cell. (The use of filter paper as a backing for the membrane is much to be preferred to a wire screen; the latter gives false values because of the sealing off of the rubber surface in contact with the metal strands, and also because of the stretching of the specimen into the spaces between the strands as the pressure is applied.) The test specimen is placed on top of the filter paper. The upper plate is placed in position and bolted down. The cell is placed in the water bath. The gas supply is joined to the inlet line and the pressure is adjusted to some convenient level by means of a reducing valve. In the case of air, 50 p.s.i.g. is a suitable pressure. It has been found by experiment that the permeability value does not change appreciably with pressure over the range 0 to 60 p.s.i.g. The exit line from the cell is joined to the volume measurement device. The apparatus is then allowed to stand for one hour in order to reach a steady condition.

Following the one-hour interval, the three-way stopcock is opened to the outside atmosphere so as to allow liquid to flow into the graduated section of the capillary tube. When the meniscus reaches a point close to the beginning of the scale, the stopcock is returned to the "through" position. The temperature of the water bath is now observed. When this temperature is exactly equal to the desired value, the scale reading is observed and a stopwatch is started. The temperature of the solvent bath and the room temperature in the vicinity of the apparatus are now measured and recorded. When the meniscus reaches a point near the high end of the scale, the water bath temperature is once again observed. When this temperature is exactly the desired value, the position of the meniscus is observed and the stopwatch is stopped. This precaution of beginning and ending the measurement at exactly the desired bath temperature is necessary in order to minimize the error due to the expansion and contraction of the gas in the low pressure side of the apparatus as the bath temperature fluctuates above and below the desired value. Solvent bath and room temperature are now observed and recorded. These values should not differ by more than 0.25°C. from those observed at the beginning of the test.

In the case of air permeability measurements at 65°C. under 50 p.s.i.g. pressure, typical test intervals are three minutes for natural rubber compounds and 30 minutes for Butyl compounds.

When other gases are employed, the procedure is identical with that given above except that the spaces on either side of the membrane must be filled with the gas in question prior to the test. This is readily done by introducing a "T" into both inlet and outlet lines. Each side is then repeatedly evacuated and refilled with the desired gas until the air originally present has been displaced.

It may be desirable to change the liquid employed in the volume measurement. For example, water may be used in the case of hydrocarbon gases.

*Calculations:* The permeability, Q, is defined as the volume of gas (c.c. at NTP) passing per second through

TABLE I

| | A | B |
|---|---|---|
| Polysar Butyl 301 * | 100.00 | — |
| Polysar Krynac 801 † | — | 100.0 |
| Philblack A | 49.00 | 47.0 |
| Stearic Acid | 1.00 | 1.0 |
| Lt. Cal. Magnesia | 4.00 | 4.0 |
| Zinc Oxide | 5.00 | 5.0 |
| Tuads | .75 | — |
| Ethyl Selenac | .75 | — |
| Captax | .50 | 1.5 |
| Sulfur | 1.50 | 2.0 |
| Cure at 292°F. (mins.) | 35 | 25 |
| Tensile Strength (p.s.i.) | 1755 | 3080 |
| Elongation at Break (%) | 540 | 470 |
| Modulus at 300% (p.s.i.) | 1045 | 2170 |
| Shore Hardness, Type A2 | 55 | 60 |
| Permeability to Air: | | |
| ($Q \times 10^8$) at 80°C. | 4.97 | 4.18 |
| 70°C. | 3.12 | 2.84 |
| 60°C. | 1.95 | 1.85 |
| 50°C. | 1.08 | 1.05 |
| 40°C. | 0.60 | 0.64 |

(*) Isobutylene-isoprene copolymer, Mooney viscosity—75; mol. % unsaturation—1.6. (†) Butadiene-acrylonitrile copolymer, Mooney viscosity —83, high acrylonitrile range.

a specimen 1 cm.² in area and 1 cm. thick, when the difference in pressure of the gas on opposite sides of the specimen is 1 atm.

If: V = observed volume of gas (c.c.)

$$\times \frac{273}{T} \times \frac{Pa + 2}{760}$$

where T is the temperature of the solvent bath in °A and Pa is the atmosphere pressure in mm. of Hg. (The addition of 2 mm. to the observed atmospheric pressure corrects for the head of liquid over the graduated scale. The correction for capillary action is negligible.)

d = thickness of specimen in cm. determined as described above;
t = duration of test in seconds;
A = area of exposed membrane in cm.², and
$\Delta P$ = pressure drop across membrane in atm., i.e., applied gauge pressure (p.s.i.g.) ÷ 14.7,

then: $$Q = \frac{Vd}{tA\Delta P}$$

## Illustrative Data

A typical set of data obtained by this procedure is illustrated in Table I and Figure 2. Here, the air permeability of a butadiene-acrylonitrile copolymer of high nitrile content is compared with that of a Butyl rubber compound over a range of temperatures. The time required for an individual test was in all cases less than 180 minutes, including the conditioning period, and was less than 90 minutes at temperatures above 60°C. For other polymers, most of which exhibit higher permeabilities than Butyl or high nitrile polymers, values may be obtained even more rapidly.

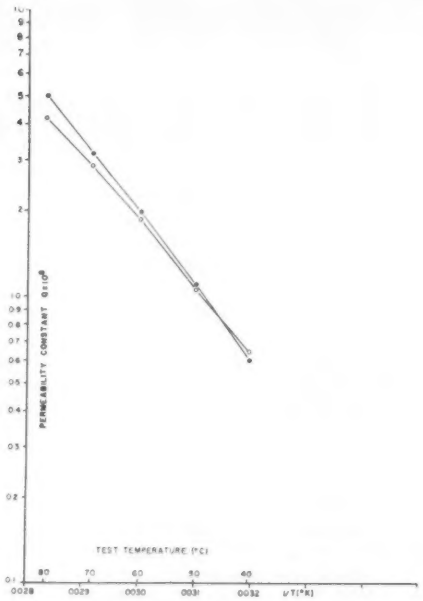



*FIG. 2—Permeability - temperature relationships for Polysar Butyl 301 (o) and Polysar Krynac 801 (0) vulcanizates.*

In this series of measurements, three readings were taken at each temperature. The individual values varied from the average in all cases by less than 3%. In another test, three readings were obtained on each of three specimens of a Butyl inner tube compound. The data showed an average value of 2.81, range 2.67 to 2.98, and standard deviation 0.12.

## Conclusion

A simple method of measuring the permeability of rubber vulcanizates to gases has been described. The method is rapid, and requires a minimum of special equipment or skill. Although developed for measuring air permeability, the method is readily adaptable to other gases.

**Automation.** M. W. Kellogg Co., 225 Broadway, New York 7, N. Y. 8½ x 11 in. 16 pp.

Combined with the effective use of color and text, this publication tells the story of automation in the petroleum and chemical industries. The instruments of automation are explained in easy to follow diagrams, which are profusely used throughout this booklet. Such important items as the use of radio-isotopes in level measuring devices and electronic instrumentation are clearly defined through the use of these diagrams. Other subjects discussed are data reduction systems, with illustrations to show how automation depends on such systems.

**Pangborn Abrasive Separators.** (Bulletin No. 1003). Pangborn Corp., Hagerstown, Md. 8½ x 11 in. 8 pp.

This catalog describes the features and operation of the company's line of abrasive separators. Included are fifteen photographs and drawings illustrating the principles of operation and the types of equipment available. Specifications and dimensions are included for all models. Four types of separators are described which handle from 33,000 to 320,000 pounds of abrasive per hour. The catalog tells how to select the proper separator for a given task and discusses both coarse and fine abrasive separation.

# The Rollevator Oven System for Hot Stretching Nylon

SINCE the introduction of nylon to tire manufacturing, Industrial Ovens, Inc., of Cleveland, Ohio, has been interested in the latex dipping and hot stretching problems involved. This company, along with the Gates Rubber Co., of Denver, Colorado, built the first full width nylon hot stretching system.

With the background achieved and a basic understanding of the problems involved absorbed, Industrial Ovens, Inc., designed a new system, called the Rollevator Oven System, on which patents are pending. This new system reduces many of the variables encountered to constants and at the same time eliminates the costly troublesome features of previous systems.

One of these systems has just been put into operation at the plant of The Frank G. Schenuit Rubber Co. in Baltimore, Maryland, and a second unit is under construction for the General Tire & Rubber Co. The Schenuit unit is a 30 yard per minute-14,000 pound tension system, while the General Tire unit is being designed for operation at 60 yards per minute.

## Need for Constant Control

To explain this unique system it is necessary to consider the significance of the 3 T's involved with the hot stretching of nylon—time, temperature and tension. In order to get uniform and satisfactory nylon hot stretching these 3 T's must be tightly controlled and held as closely as possible to constants. This presents a problem especially with variable processing speeds.

With the Rollevator Oven System, the tension on the nylon fabric is held constant between the hold back and pull roll stands. Each stand is driven and signals are taken from either a constant tensioning device or a constant stretch device. Tensions up to 20,000 pounds can be applied to the nylon fabric without the aid of any nips.

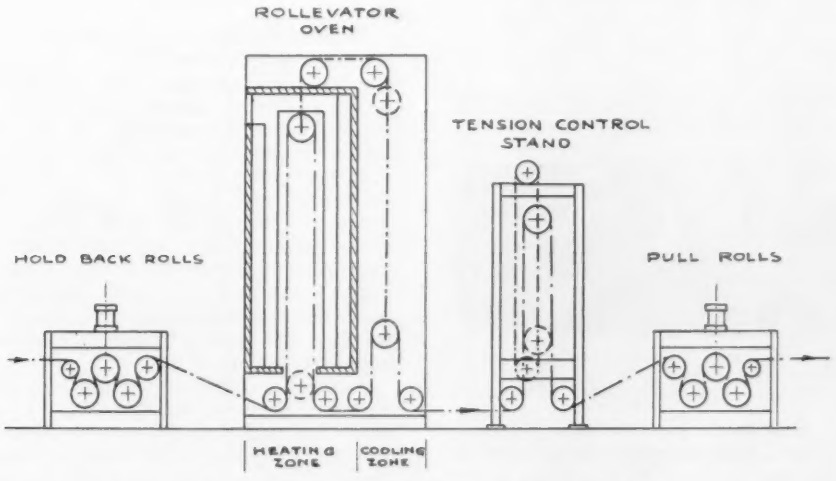
The other two T's—time and temperature—are considered together. When stretching nylon tire fabric there is an optimum length of time at a particular temperature at which the best results are obtained. Or to put it another way, heat exposure time of the nylon should be held constant when stretching at a constant tension. The Rollevator Oven System automatically holds the time-temperature relationship constant at any line speed and at the same time eliminates the necessity for cold purging the oven when the operation is stopped to avoid damage to the nylon from over-heating.

## Explanation of System

The accompanying diagram shows in schematic form the Rollevator Oven System. After the nylon leaves the hold back stand it enters the oven at the bottom, travels up into the heating zone, passes over the Rollevator roll and down again within the heated section to another stationary roll and over to the cooling zone. In the cooling zone the fabric also enters at the bottom, travels up and over a roll and then goes down and out to the tension control device and pull roll stand.

The time the nylon fabric is exposed to the heat is held constant by lifting or lowering the Rollevator roll within the heated zone in direct relationship to the line speed. For instance, if the maximum speed of the line is 30 yards per minute, at that speed the Rollevator roll will be in the extreme up position and the amount of time a given segment of fabric is exposed to the heat is X seconds. Should the line be slowed down to 15 yards per minute the roll will assume a position one half the distance up the oven and the amount of time a given segment of fabric is exposed to the heat still remains X seconds.

The Rollevator roll in the heating zone and the roll in the cooling zone are connected by an endless chain.




*Schematic of the Rollevator Oven System*

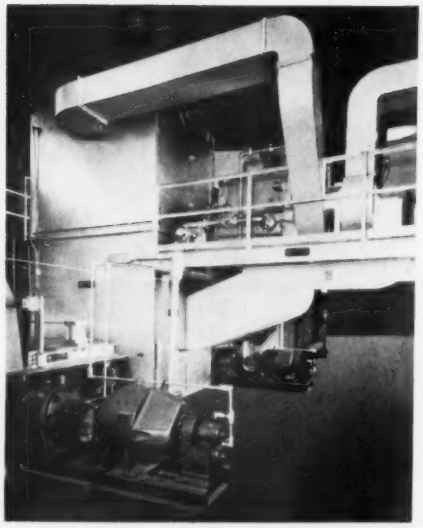
When the roll in the heating zone moves up or down, the roll in the cooling zone moves in the opposite direction. The tensions exerted on the two rolls balance each other out and the total amount of material in the system (from hold back stand to pull roll stand) always remains the same. This movement of rolls is an automatic reaction whenever the operational line speed is varied.

### Safety Features

In case of emergency stop, or when the complete line is at a standstill, damage to the nylon is prevented by the automatic lowering of the Rollevator roll completely out of the heating zone. This is in contrast to other systems which depend on a quick cool purging of the oven to prevent degradation of the nylon tire cord.

When the Rollevator roll is out of the oven the roll in the cooling section is in the extreme upper position. Upon restarting the line there is no delay in getting the oven back up to temperature. The Rollevator roll is returned into the oven and after the proper amount of exposure the pull rolls and hold back rolls are set in motion.

The Rollevator Oven System was the answer to a definite need—controlled and low cost nylon hot stretching. The success of this system is reported to have been proven in operation and the enthusiasm for its simplicity is the most favorable reaction.

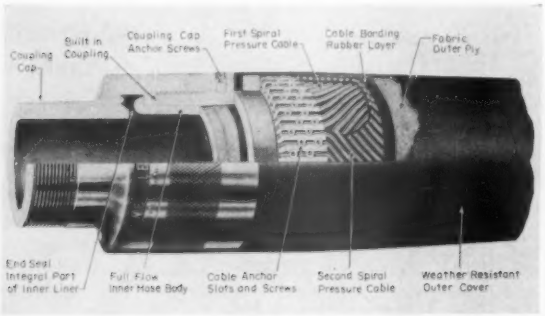


*Over-all view of the 30 yard per minute-14,000 pound maximum tension system installed at the Schenuit Rubber plant in Baltimore, Maryland. The oven is direct gas fired, using high velocity air jets for maximum heating efficiency*

## Integral Coupling Assures Long Hose Life at High Pressures

A HIGH pressure, large diameter hose with integral couplings designed by J. A. Muller of the Thermoid Company of Trenton, N. J., is solving problems in many industries. This hose is used for conveying liquids in large quantities at pressures of 1500 to 2500 psi where flexibility is required.

The ingenuity of the Thermoid hose unit lies in the method of securing the hose proper to the couplings. Sudden parting of the hose and couplings has been eliminated. As shown in the accompanying illustration, the pressure-resistant steel cables are drawn through slots milled into a solid steel tube and secured by special set screws. The steel tube extends beyond the slots, and is threaded on the outer end to receive the pressure seal cap. The couplings are thus made an integral part of the hose.


Coupling Cap
Built in Coupling
Coupling Cap Anchor Screws
First Spiral Pressure Cable
Cable Bonding Rubber Layer
Fabric Outer Ply
End Seal Integral Part of Inner Liner
Full Flow Inner Hose Body
Cable Anchor Slots and Screws
Second Spiral Pressure Cable
Weather Resistant Outer Cover

*This cut-away view shows how the steel pressure-resisting cables are drawn through slots milled from solid steel tubing and anchored by set screws in the new Thermoid hose.*

The Thermoid method of joining the hose and couplings permits full flow of fluid through the coupling and eliminates flanges, bolts, bulges and sharp changes in outside diameter. Exact placement of the cables and precise control over the angle of lay is also achieved. The cables cannot shift position or change the angle of lay under pressure.

This hose finds its greatest present use in the oil fields on drilling rigs. Drilling mud is conveyed by the hose at pressures up to 2500 psi from a fixed metal standpipe to the Kelly swivel through which the mud is pumped into the drilling pipe. A flexible connection is required because the Kelly moves up and down as the pipe is handled in and out of the hole. Hose of 2½, 3 and 3½ inch ID are standard in the oil fields in lengths of 50 to 60 feet.

Hose of the same type is also used on drilling rigs in shorter lengths (10 to 18 feet) to connect the mud pump and the fixed standpipe. In this application the hose acts as a vibration dampener and has reduced pipe breakage and loosened connections. It also permits connecting the pump and standpipe without precise alignment.

In the lumber industry of the Northwest, the Thermoid hose with integral couplings is used to convey water at 1500 psi and 1500 gallons per minute to a rotary log debarking ring. Logs pass through a rotating ring containing four holes from which water jets and removes the bark. A flexible connection is needed because the ring moves as it follows crooks and bends in the log. A 4-inch ID hose is required to deliver the necessary volume of water.

Another growing use of the hose in shorter lengths is that of providing flexible joints in high pressure pipe lines. The importance of precise alignment is decreased and the transmission of vibration from pumps is reduced. High pressure hose with integral couplings of this type can be produced up to 6-inch ID.

# Rubber and Plastic Packings

By FREDERICK C. THORN

*Research Director, Garlock Packing Co., Palmyra, N. Y.*

THERE have been numerous papers published recently with respect to the two rather specialized types of packing, viz., the O-ring in its dual capacity of sliding contact packing and stationary gasket, and the molded synthetic radial seal. The impression might be gained that the packing industry is a minor branch of the molded rubber goods industry. Actually, of course, the packing industry is much more extensive and employs practically every material in the animal, vegetable and mineral kingdom.

In addition to natural rubber, synthetic rubber, silicone rubber and their compounding ingredients, which comprise the materials used in the specialty packings mentioned, the packing industry has to deal with phenolic resins, Teflon, nylon, polyethylene, vinyl plastics, acrylic plastics, gelatin, all of the petroleum products, coal distillation products, animal and vegetable resins, fats and waxes, glycerine glycols, all of the fibers—animal, vegetable, mineral and synthetic, both loose and in the form of felt—paper, yarn and fabric; also cork, leather, graphite and all the metals—cast, rolled, foil, wire and comminuted.

Until recently ceramic materials would have been excluded, but the advent of glass, porcelain, and steatite axial seal elements makes this exclusion no longer feasible. However, we are considering in this paper only those packing types in which rubber or plastics are responsible for both the service success and the service limitations. Simple rubber moldings comprise but a small proportion of these.

Note: This article is based on a paper presented by the author before the Rubber and Plastics Division, American Society of Mechanical Engineers, November 30-December 1, 1950, New York, N. Y.

## Gaskets

The broad divisions of packings are into gaskets, discs, sliding contact packings and diaphragms. A gasket is a packing between surfaces in essentially stationary relationship. As previously mentioned, the O-ring is used frequently as a gasket. Being a free ring in a groove, it is exposed rather completely to the medium being handled, is used generally in contact with highly finished surfaces, is self-tightening, and its requirements are therefore somewhat special.

A more familiar type is perhaps the gasket cut from flat sheet installed in the commercial bolted flange and exposed to the fluid medium on the edge only. Its requirements are basically mechanical rather than chemical. The desired mechanical properties are conformity, retraction modulus, relaxation, compressibility, thermal expansion, coefficient of friction, adhesion to metal, and swelling pressure generated by absorbed fluids. These are not included among the conventional rubber properties and standard methods for their measurement do not exist at this time.

To understand the importance of these properties it is necessary to consider briefly the mechanics of the bolted joint. In Figure 1 is shown a somewhat diagrammatic "indicator card" of a 4⅜ x 6⅛ x 1/16-inch red sheet gasket between phonograph finish flanges at 212°F.

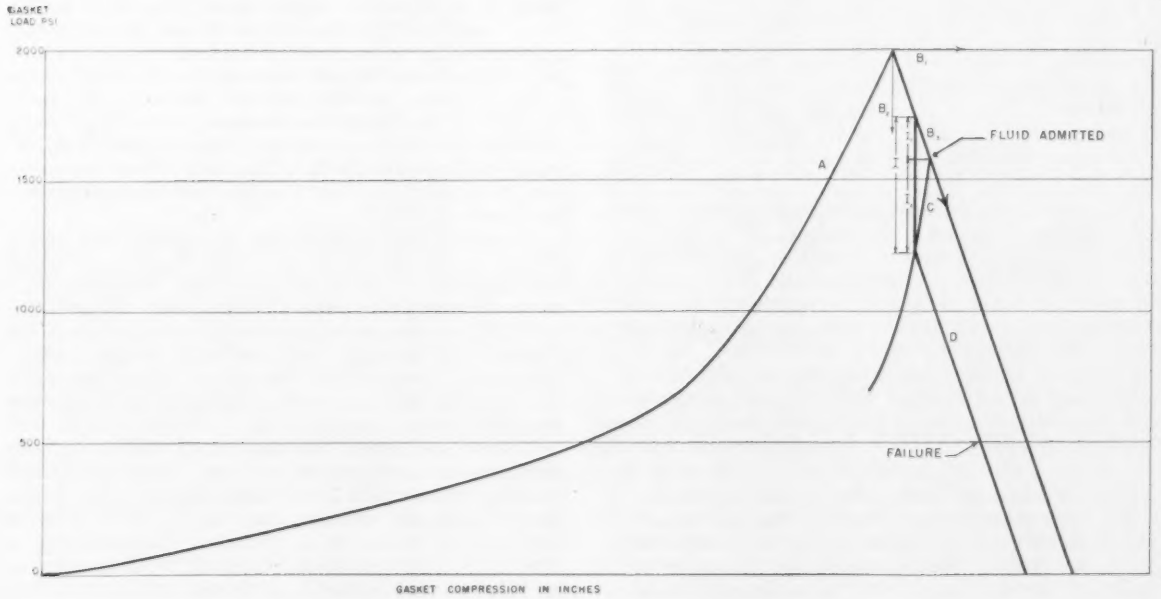



*FIG. 1—Diagrammatic "indicator card" of red sheet gasket between phonograph finish flanges.*

The first portion of the curve (A) is the compression curve on installation. It is a function of the compression modulus of the material, the gasket dimensions and the flange finish. This terminates in the pre-load or "seating stress".

After the original tightening some interval elapses before fluid pressure is admitted. To simplify the picture it may be assumed that the flanges remain at 212°F. during this interval. If the bolts were long and stretchy, the stress would remain substantially constant, and the gasket would undergo creep as shown by B-1. If the bolts were completely inextensible the gasket would undergo relaxation at constant strain, as shown by B-2. Generally speaking, the bolts are stretched to some extent and the stress coasts down an inclined line (B-3) which is the stress-strain curve of the bolts in reverse. This is called "creep-relaxation" of the gasket because it is a composite of creep and relaxation. Progress along B-3 is related in some way to the logarithm of elapsed time. It is apparent that the intrinsic creep or relaxation properties of the gasket material are important in determining the length of B-3.

At this point fluid is admitted which may be conceived as boiling water at 500 psi. There is usually an immedate shift of bolt load away from the gasket due to the fact that the bolts are required to support the additional load of the fluid pressure across the central opening. Locally there may be an even greater shift of bolt load due to external bending stresses. The total added unit stress, fluid plus bending, is shown by Line I.

As a consequence of the shift in stress the joint opens up, i.e., the gasket retracts following Curve C. The length of Curve C is found by tucking Line I into the angle formed by B-3 and C. $I_1$ adds to the bolt stress, $I_2$ comes off the gasket stress. The proportions of $I_1$ and $I_2$ are governed by the relative slopes of the bolt extension curve and of the gasket retraction curve, respectively. A gasket with a low retraction modulus loses less load under these conditions than one with a steep retraction modulus. (Note: The mathematics of this were dealt with very thoroughly by Mr. Irving Roberts in a paper on "Gaskets and Bolted Joints" which was published in the *Journal of Applied Mechanics*, June 1950.)

Rubber is pretty good in this respect—much better, say, than lead. In popular language we say it is elastic, or resilient. After the new equilibrium is reached, creep-relaxation resumes at a logarithmic rate along Line D parallel to B-3 until it crosses the 500 psi line when failure occurs by leakage. Failure may occur at some stress higher than 500 psi if the gasket does not conform perfectly.

The ratio of the residual gasket load at failure to the fluid pressure is known in the parlance of the A.S.M.E. Code for Unfired Pressure Vessels as the "m" value, and is assumed to be a property of the gasket material. Of course, it is not exclusively a property of the gasket material, but depends also upon the gasket dimensions, the surface finish of the flanges, and the prior history of the joint. Most of the published "m" values have been arrived at following cold compression and instantaneous admission of cold fluid. In other words, curves B-3 and D have been deliberately omitted, and the fluid pressure moved up until failure occurred.

Fluid relief is assumed to be the fluid pressure not to the inner edge but to the center line of the gasket, and $I_2$ is estimated by assuming that it is equal to I, i.e., C is vertical. Both of these assumptions are generally far from correct. An "m" value arrived at in this way has no relationship to the actual "m" value at failure in service, especially hot service. In most rubber gaskets, "m" values are pretty close to unity to start with and get closer as relaxation proceeds.

The real enemy is the creep-relaxation expressed by the B-3 and D curves. Unfortunately, the A.S.M.E. formulas do not make any provision for this important property, with the result that many gasketed joints designed in accordance with these formulas have failed sooner than expected.

Still earlier failure results if the fluid is allowed to cool to room temperature without loss of pressure, and is a consequence of thermal contraction of the gasket. This manifests itself in a rapid extension of the D curve. This also is ignored in the A.S.M.E. formulas. Unfortunately, all rubber compounds exhibit high volume coefficients of thermal expansion in comparison with surrounding metal parts and not much can be done about it.

In compressed asbestos sheet, which is a rubber compound packed full of asbestos fiber, this effect is minimized. This together with the excellent hot relaxation properties of compressed asbestos sheet make it the favorite for hot flange applications, in spite of a rather poor conformity as shown by high "m" values. The higher the temperature, the better becomes the "m" value, but also unfortunately the worse becomes the relaxation rate. At flange temperatures above 500°F. compressed asbestos sheet undergoes too rapid a relaxation rate to be practical as a gasket. Of course, a flange at 500°F. may be actually carrying superheated steam at 800°F.

If a pipe fitter restores the bolt load at intervals, the new relaxation cycles thus inaugurated are progressively slower and eventually become harmless. Too many however think they can tighten once, cover with insulation and walk away. Under these conditions, relaxation, retraction, thermal contraction and "m" values determine how long the gasket will last. Self-tightening designs, such as O-rings, boiler man hole types and the new "pressure seal" joints, are foolproof and will undoubtedly be more widely used within their service limitations.

Up to now there has been no mention of compressibility, which many would assume to be a fundamental property of a gasket. In fact, many think that if they have a sufficiently compressible gasket they can dispense with the usual efforts to make the flanges parallel and rigid. The fallacy of this argument is seen by reference to curve A. The pre-load shown is of course average. If the flanges are warped or misaligned some parts are at lower and some at higher values. The low values undergo substantially the same stress deterioration as the average, and of course reach the failure line that much quicker.

A chain is no stronger than its weakest link and a gasket is not farther from failure than its point of least pre-load. To make matters worse, the compression curves of most gasket materials are concave which means that 10% less compression means 20% loss of pre-load. There is no substitute for rigid and parallel flanges, if pressure is to be held. Of course, if fluid pressures are negligible and mere gasket contact is sufficient, compressibility has some value.

Gaskets sometimes blow out, which leads to a consideration of coefficient of friction. Since the lowest genuine "m" value before leakage is unity, and since a gasket is usually five times as wide as it is thick, a coefficient of friction of .1 to steel is usually enough to prevent blowing out at least until after leakage has occurred, and most gasketing materials have at least this much. Tongue and groove and male and female flanges are usually not needed to prevent blow-out. If, how-

ever, the gasket is narrow and thick, and the flanges polished or painted with graphite, the situation may be otherwise. Disassembly is just as easy if a gasket is graphited on one side only as on both sides and the danger of blowout is reduced. Teflon is one of our newest gasket materials and has been somewhat troublesome because of its slippery character.

Closely allied to friction is adhesion. Rubber gaskets have a happy faculty of growing fast to most metals, especially in hot service, and when uncontaminated by graphite. Except for disassembly trouble, this is excellent from a mechanical standpoint. There are gasketed water pipe joints which have been buried in the ground for fifty years and which are functioning even though the "m" values must have fallen far below unity as a result of relaxation. Adhesion is what is holding them. Unfortunately, there is no sure way to cause adhesion so it cannot be depended upon.

The action of swelling agents is probably more important to exposed gaskets such as O-rings than to confined gaskets. A swelling agent can damage a confined gasket only by the development of swelling pressures within the material which cause the edges to extrude into the clearances and crumble as they extrude. If this crumbling action does not take place, the action of a swelling agent is beneficial rather than otherwise.

For instance, the natural rubber gasket employed in cast iron joints is totally enclosed in fabric so that it cannot escape through clearances. Such a gasket has been employed to pack 100 psi benzol for a year and at the end of that time not only was the gasket uninjured but the bolt stresses were higher than at the start. A similar joint on dry gas had lost half its initial bolt load in the same period because there was no benzol present to swell the gasket.

Compressed asbestos sheet made from natural rubber or GR-S type rubber is employed quite regularly against not only hot crankcase oil but solvents such as gasoline and benzol. These results would not be predicted from beaker swelling tests.

Of a somewhat different character is chemical attack. Here again, beaker tests do not give a correct indication. Concentrated sulfuric acid, oxygen and halogen gases harden exposed edges of rubber gaskets and set up barriers against further attack. Nitric acid, however, forms products which are soluble in the acid and are washed away. Any rubber gasket, therefore, is eaten out rapidly by nitric acid. Butyl rubber and vinyl plastics were the best recommendation until the advent of Teflon. Most nitric acid gaskets today are Teflon or Teflon-jacketed. Polyethylene can be used if the temperatures are not too high.

## Discs

A disc is a gasket whose contact is frequently broken and restored. Valve discs are frequently subjected to terrific handwheel loads which are aggravated by putting a Stillson wrench on the handwheel. Such a load was recently measured and found to be 30,000 psi of seat area. A rubber material to stand such a load at steam temperatures has to be somewhat specialized. Another peculiar feature of valve disc service is the wire-drawing effect resulting from throttling. High asbestos fiber formulas which do well on crushing are often ruined by wire drawing.

In the case of faucet bibb washers we encounter another peculiar property. Nobody likes to stand in a hot shower bath and have it turn cold. This is due to the hot recovery of a bibb washer which was indented in the cold. In the case of spring-loaded relief valves, it is necessary to worry about the development of adhesion between disc and seat. In the case of valve discs we are also dealing with obscure properties for which adequate evaluation methods do not exist.

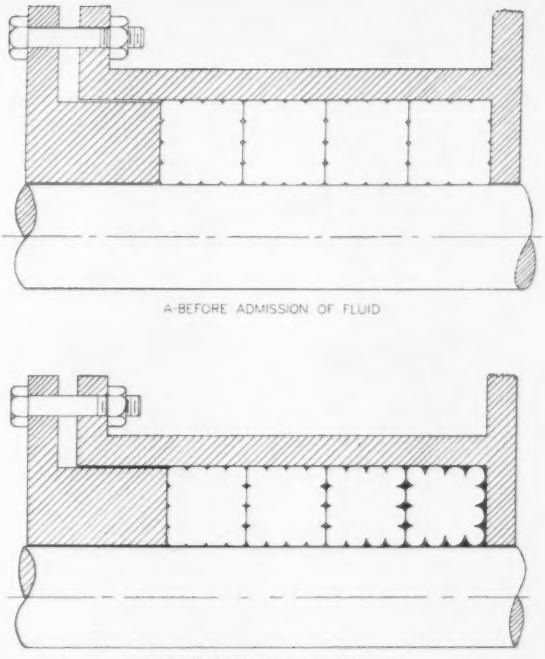



*FIG. 2—Sliding contact packing of the conventional type.*

Discs for reciprocating pumps involve some other requirements. The good conformity of rubber compounds as expressed by low "m" values make them ideally suited for such check-valve service. Unfortunately, rubber compounds also frequently have high creep rates, and when used on seats with radial ribs they creep so badly into the clearances that they have to be re-faced often. If the edges of the seat are sharp they are cut; therefore, resistance to cutting is important. If a hard disc designed for a hot water pump is used accidentally with cold water it is likely to crack; impact resistance as shown by the Izod test is therefore important. If a disc bends up at the rim (as it does on certain large condenser pumps) it will fail by fatigue cracking around the center hole; therefore, fatigue resistance is important. None of these properties are evaluated by the usual tensile and elongation tests.

## Sliding Contact Packings

In the case of sliding contact packings of the conventional type, as used in stuffing boxes, there is a new set of requirements and a new set of properties to go with the requirements. It is necessary to consider briefly the mechanics of the stuffing box.

In Figure 2, Sketch A shows one concept of a stuffing box containing square packing immediately after tightening and before admission of fluid. Whether the shaft is stationary, or in rotary or reciprocating motion, is relatively unimportant. The roughness of the packing is purposely exaggerated. The gland unit load is opposed by a similar load at the back of the box, ignoring

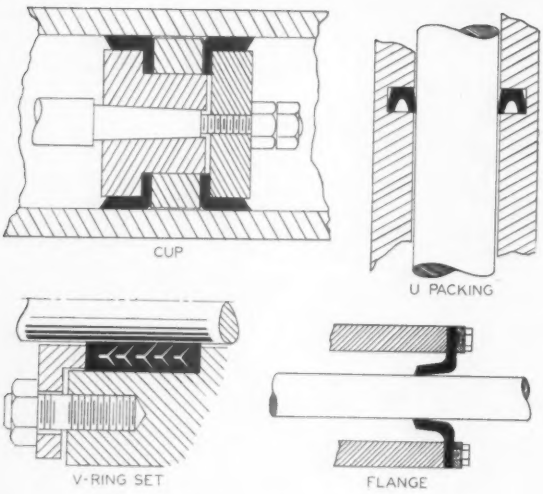



*FIG. 3—Various types of packings.*

friction on the sidewall, and each ring in the set is under a similar load on both faces. All loads are carried on the high spots of the packing, leaving intervening areas out of contact. A similar but lesser unit load is directed radially from the shaft and inside wall of the stuffing box, ignoring hoop stresses in the packing. If the packing acted like a perfect fluid, the axial and radial unit loads would be equal. If the radial load is higher the packing is self-tightening, which will be considered later.

Let us assume the radial load is lower. When fluid is admitted this situation is disturbed (Sketch B). The fluid invades the open spaces at the back of the box and between rings, and thereby decreases the mechanical load on the high spots. This has been shown by indicating that the high spots are not flattened to the same extent as formerly. Since the fluid pressure is assumed less than the originally applied gland unit load, contact is not completely lost at the back of the box or between rings. The fluid escapes continuously through the channels along the shaft. Since the fluid pressure decreases as the gland is approached, the mechanical load at this end remains relatively unchanged. The total gland load increases, this being, as in the case of gaskets, a function of the relative modulus of the bolt curve and of the packing retraction curve. However, the fluid pressure does not merely add itself to the gland load as is often assumed.

Although Figure 2 indicates interrupted dry contact along the shaft, the motion of the shaft, if rapid, tends to force fluid beneath these protuberances by the well known fluid-wedge effect, so that it is not necessary to assume any areas in dry contact for a long period. Neither the dry coefficient of friction of the packing material nor its abrasive qualities against the shaft are of much importance, contrary to popular opinion. This lifting effect is furthered by breaking up the continuity of the rubber area with yarns.

Substitution of pure fluid film contact for partly dry contact reduces friction sharply and is desirable, even though it increases the leakage rate. Best results are obtained after the protuberances along the shaft have worn off, giving a thin sheet of escaping fluid everywhere, the thickness diminishing as the gland is approached, since the mechanical component of the load remains higher at this end. The ring remote from the pressure will always be found to have done most of the work.

Axial mechanical load pursues a diminishing curve through relaxation just as it does with gaskets, and radial load diminishes with it. As the clearance grows, the leak increases, until it becomes necessary to tighten the gland. This inaugurates a new cycle of dry friction, wear, and the restoration of fluid film conditions.

With this mechanical picture in mind we can see immediately the properties required in a stuffing box packing and see wherein rubber fits into the picture. In the first place, the ring must have some power to convert axial load to radial load. In manually adjusted packings this conversion must not be too perfect and is frequently inhibited by transverse layers of fabric.

In the second place, the surface must conform fairly well to the shaft since it is unreasonable to expect the user to accept an abnormally high leakage rate during the period in which he is wearing the packing to a fit. On the other hand, the surface must not conform so closely that a fluid film cannot form. In the O-ring this is avoided by the fluid wedging between the metal surface and the curved surface of the packing. In conventional packings it is accomplished by fabric insertion which breaks up the continuity of the rubber surface.

In the third place, the thermal expansion of the packing as a whole should be very little, if any, greater than that of the surrounding metal parts to guard against unstable seizure. In the O-ring this is accomplished by the free space surrounding the ring, into which the rubber can expand harmlessly. There is no free space in a square packing, so other means must be provided. Large volumes of fabric insertion again provide a partial solution; central holes in the packing and braided rings in the same set are also employed. In rubber-bonded metal foil packings, the percentage of rubber is too low to cause much trouble; the same is true of the so-called rubber-bonded "plastic" packings, which are mechanical mixtures of a small amount of rubber cement with a large volume of asbestos fiber and graphite. These types can be employed on high speed rotating shafts with impunity. Teflon has a very high coefficient of thermal expansion and great care must be employed in using it on a high speed shaft.

In the fourth place, the packing, even when hot, must not absorb the thin fluid film on which it is running. Others have called attention to the necessity for close control of the oil absorption properties in O-rings; in square packings we have a similar problem. In the days before oil-resistant synthetics were available this was not easy. For instance, the ordinary rolled asbestos packing used on reciprocating steam engine rods was, and still is, bonded with natural rubber and yet is required to run freely on a film of emulsified cylinder oil. This is accomplished by saturating the fabric with glycerine, which keeps out the oil.

Finally, the packing should have elastic retraction to absorb shaft gyration or weave and also to compensate for wear, making gland adjustments infrequent.

Please note that the properties that have been mentioned, viz., transmission of radial pressures, correct degree of conformity, thermal expansion, fluid absorption, and resilience, are not those which form the basis for present-day purchase of such packings. Instead, we find specifications published, or implied, for the tensile strength of the fabric and ply adhesion of the rubber layers—requirements taken from belt specifications and wholly irrelevant as regards packing service.

If a sliding contact packing transmits a radial load higher than the impressed axial load, it is self-tighten-

ing packing. O-rings are of this type. A slight initial radial load resulting from radial compression is all that is needed; thereafter, the radial load keeps ahead of the fluid pressure, regardless of how high the latter may become.

Cup packings (Figure 3) accomplish the same purpose. The initial load is secured by lip interference; therefore, the radial load is maintained by the differential between the full fluid pressure inside the cup and the reduced or gradient pressure along the face. It is evident that the gradient is secured only when the heel is kept clear of the cylinder. For this purpose the base of the cup is usually reinforced with fabric plies or metal. A flange or hat-packing is a cup designed to pack on a rod or shaft. It is governed by the same principles. When used as an oil-retaining ring at low pressure, as in radial seals, the initial radial load is lost because of relaxation and there is no fluid pressure to maintain it; a contracting spring is therefore generally necessary.

A U-packing has both inside and outside lips. A set of V-rings may be looked upon as a set of nested U-packings designed for insertion into a conventional stuffing box; only a very gentle axial load is necessary however to make the packing go to work. Thereafter, the axial load can be and usually is dispensed with, the packing floating freely in the stuffing box.

Self-tightening packings as a class do not create problems in respect to thermal expansion, and are well adapted to take care of shaft weave or shaft gyration. Attention has to be paid however to fluid absorption. For instance, neoprene-bonded V-rings are good for oil and poor for water; rubber or GR-S bonded rings are good for water and poor for oil; neither are much good against chlorinated liquids or esters. Imperfect conformity is secured by fabric insertion or by the use of exceedingly hard materials. Teflon cups and V-rings perform excellently on almost all fluids at almost all pressures and temperatures; nylon is good for oils and polyethylene for water or oils, but both are somewhat limited as regards temperature.

The problems in respect to valve stem packings are somewhat different in that motion is slow and infrequent and the danger of unstable thermal seizure is therefore lessened. On the other hand, the requirements as regards leakage are usually more severe, compelling closer fits to the shaft. Since there is no fluid wedge effect the coefficient of dry friction is of greater importance in valve stem packings than in packings for high speed shafts and Teflon is a very interesting material in this respect.

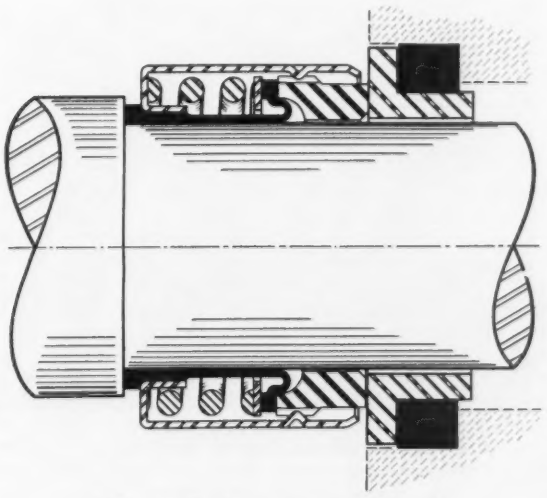


*FIG. 4—Package type rotary seal.*

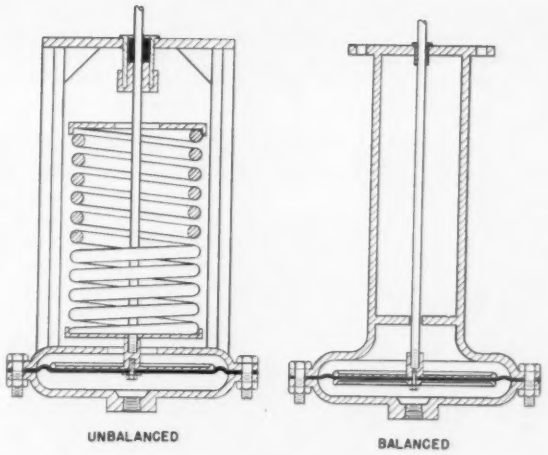



*FIG. 5—Typical flat diaphragm motors.*

Another problem encountered by rubber or plastic-bonded valve stem packings is adhesion to the stem on long standing, which in the case of a control valve may render it inoperative. Teflon is believed to be free from this difficulty. A third problem is the development of corrosion of the valve stem within the fluid film trapped beneath the packing. Of course, this is basically a problem for the metallurgist but certain components of a rubber compound may contribute to it. Free sulfur which reacts with water and air to form sulfur acids is definitely suspect in this particular.

The axial seal (Figure 4), in which stationary and rotating collars contact on their flat faces, opens up an entirely new line of requirements and materials. Soft rubber is generally limited to the devices employed for keeping one or both of the two elements flexibly suspended. (In the illustration shown these are a bellows and a gasket, both of nitrile rubber.) Sliding arrangements employing rubber O-rings, V-rings, or flange packings are also used; for chemical service Teflon V-rings are substituted. None of these softer materials have been employed extensively for the actual wear faces; these are composed of hard materials such as bronze versus graphite. Many of the graphite seal rings employed, however, are molded with a phenolic resin binder, and phenolic laminate and powder moldings are employed instead of graphite for the less severe service conditions such as automobile water pumps.

## Diaphragms

Two typical flat diaphragm motors are shown in Figure 5. In the first, the diaphragm is required to support the fluid pressure (air) across the unsupported opening. It is therefore necessary to reinforce it with fabric. Rubber covers are universally employed. However, they are subject to oxidation cracking at high temperatures, and to pulling out at at the rim due to relaxation of the originally impressed bolt load. Silicone rubber covers are exceptionally good in these respects. Also, if the rubber cover is lacking in elasticity, i.e., has a high hysteresis, and the diaphragm is used to

operate a pressure-regulating valve, the sensitivity of the regulator is impaired. Resistance to fatigue cracking, relaxation and hysteresis—these are the desired properties in a rubber diaphragm cover, but instead we find specifications reading in terms of tensile and ply adhesion.

The second type of diaphragm is subjected to balanced pressures on both faces and generally requires no fabric insertion. Elongation and tension set are important however, since rim relaxation causes leaks to the atmosphere. Both types of diaphragm in addition to their use in motors can be used in pumps or simply as separators as in air accumulators.

The cylindrical diaphragm or bellows has been mentioned as a component of the axial seal. It is also widely used as a pipe expansion joint (Figure 6). These joints, within their temperature and pressure limitations, are usually more capable of taking care of higher degrees of misalignment and joint movement than are metal bellows of equivalent size. They are also less subject to fatigue cracking. The wide variety of fluids handled imposes severe problems of resistance to absorption and chemical attack.

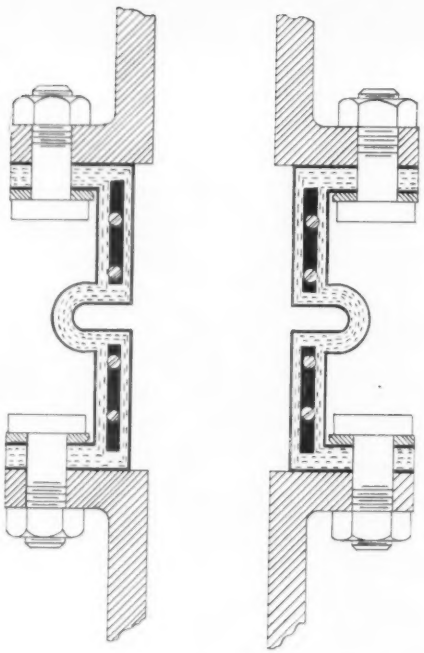


*FIG. 6—Cylindrical diaphragm or bellows.*

## Summary

Summarizing, the properties of rubbers and plastics which have insured them a prominent place in mechanical packings are in many cases obscure and not presently subject to measurement. Design engineers, although making extensive use of rubber-bonded packings, have contributed very little to an analysis of the mechanics involved or to the testing of packings, and to the consequent exercise of a rational procedure in packing selection. The cooperation of packing manufacturer and user in programs designed to improve this situation is greatly to be desired.

# Liquid Polybutadiene Holds Promise of Commercial Applications

POLYMERIZATION of dienes by sodium catalysis to make rubberlike products can also be used to manufacture a liquid polymer, according to the Phillips Petroleum Company, Bartlesville, Oklahoma, which has been doing considerable development work in this direction. The reaction takes place in a solvent at elevated temperatures, with an increased charge of catalyst. Properties of the new product make it important for use in protective coatings, casting and laminating resins, and as a vulcanizable rubber softener.

A protective coating with a high gloss and a strong, hard finish can easily be produced from liquid polybutadiene by adding a common metallic drier and a mineral solvent. Two coats on wood form a tough transparent finish, flexible enough to withstand hammer blows without excessive cracking or turning white, according to the company.

Phillip's liquid polybutadiene is a highly unsaturated polymer with a molecular weight of 1300, a viscosity of 2500 centipoises at 100°F., and a specific gravity of 0.91. Unlike previous butadiene polymers, which have long open-chain molecules, liquid polybutadiene contains only 80% of the theoretical double bonds, suggesting the occurrence of cyclization. Ultra-violet scannings support this conclusion by indicating that cyclo-olefinic rings are present in the polymer. This peculiar structure, with conjugated unsaturation and a high content of vinyl groups, is the main reason for exceptional reactivity of the liquid polybutadiene.

Liquid polybutadiene's major advantages lie in its drying and cross-linking properties. Heating to 500°F. in the absence of air forms a highly cross-linked, transparent resin—with exceptional temperature stability (little or no deterioration at 600°F.). The resin has a dielectric constant of 2.42 and a dissipation factor of less than 0.0005 at $10^6$ cycles.

Polybutadiene's freedom from odor and taste and its chemical resistance point toward its use in food can enamels. Polybutadiene resins adhere well to glass and can be used as a binder for the preparation of fiber glass-reinforced laminates. One such laminate—of 12-ply glass cloth—has a flexural strength of 29,000 p.s.i., an Izod impact of 25.6 ft./lb. per sq. inch, and a resin-to-glass bonding strength of 1235 p.s.i.

According to Phillips Petroleum, polybutadiene is an effective softener for natural or synthetic rubber. It covulcanizes with rubber and is only partially extractable from the stock after vulcanization. Maleic anhydride reacts with liquid polybutadiene to form a highly cross-linked polymer, which offers possibilities as an ion exchange resin. The polymer is insoluble in water, caustic, and organic solvents.

# New Materials Handling Operation Doubles Storage Space and Reduces Costs

THE United States Army's mechanized cavalry proved its field ability only 10 years ago in Europe. Tanks and half-tracks, controlled by the vital, hard-rubber bogie wheel, demonstrated their tactical striking force again and again through Holland, Luxembourg, France and Germany. With the full recognition of tank value in our national defense picture, the production of bogie wheels is assuming a growing position of prominence in the rubber industry. When the United States Rubber Company, manufacturers of tires, radiant heating cable and a multitude of other industrial rubber products, was awarded a government contract for the manufacture of bogie wheels — dependable materials handling was classed as being of the utmost importance.

Bogie wheels must perform under some of the most difficult conditions on earth. They are of maximal significance in the proper functioning of tanks and other mechanized vehicles. Fitted inside treads, their movement is controlled by acceleration or deceleration. They smash—they bounce—they jerk . . . but they must continue to roll correctly if the tank is to remain fully in the driver's control. While doing this, they help to keep the treads in position.

Wheel strength and flexibility are absolute necessities. Too, the bogie wheel's hard rubber must be of exceptionally solid content, adhesive, fatigue-resistant and able to withstand endless shocks. It is recommended that treads be removed prior to travel on good, solid surfaces. In cases of this type, the entire bulk of a huge tank is borne by the bogie wheels. While the number of wheels will vary with the size of individual tread and tank types, even a large number, as twenty-four, must be very rigorous to bear such vast steel and manpower tonnage.

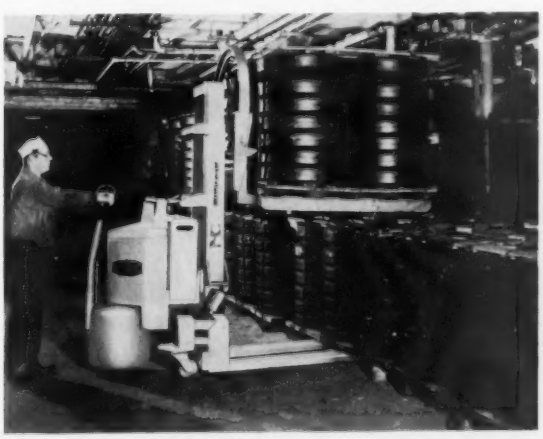


*FIG. 1—A Lewis-Shepard JackStacker handling a load of Army tank bogie wheels weighing approximately 4,200 pounds at the U. S. Rubber Company's Detroit plant.*

*FIG. 2—Operator transferring a load of 18 inner tube cartons directly from delivery trucks to a trailer backed up to the dock.*

The U. S. Rubber Co., interested in making wheels of excellent grade, recognized the import of intelligently keyed materials handling through their entire production cycle. They contacted the Lewis-Shepard Products, Inc. of Watertown, Mass., producers of a complete line of materials handling trucks. The reply provided a definite solution. As in all questions of materials handling, their executives pointed to the need for a balanced operation, where the number of available personnel is equal to the requirements of the equipment . . . no more and no less. Thus, men are not wasted, having nothing to do, and the equipment is not over-handled, reducing its efficiency. With this in mind, the U. S. Rubber Co. would be able to obtain valuable, integrated performance.

Thereupon, the electric JackStacker (open face pallet type) went into action at U. S. Rubber's 6,000 man Detroit plant, where the bogie wheels were to be made. The wheels, after leaving the line, were loaded on open face pallets, holding 42 units in six rows of seven wheels each. After this, the JackStacker would pick up the pallet (Figure 1), weighing approximately 4,200 pounds, and transfer it to the appropriate storage rack. Working for 24 hours a day and for six days per week, the JackStacker proved exceptionally profitable. Costs have been very favorably decreased and a great deal has been saved in man-hours. Other economies in handling, developed with the use of the trucks, have enabled U. S. Rubber workers to accomplish more than ever before. Storage space alone has been increased 100% by JackStacker use. This indicates intelligent, plant-wise operating efficiency. The period when stacks of heavy, cylindrical bogie wheels were stored manually, consuming man-hours and muscles as well as space, is at

an end. The JackStacker tiering methods adopted by U. S. Rubber have proved to be invaluable.

Moreover, a number of intrinsic features in the truck have pointed to individual working advantages. A JackStacker, as a functionally designed piece of mechanical equipment, not only recognizes its duties but also takes careful note of the surroundings in which it is to work. Advantages have been engineered into it so that it would work well in a small stock room.

One benefit to production managers and foremen is articulated linkage. Due to parallelogram suspension, both the load frame and the drive unit of a JackStacker and other trucks move independently of one another on casters and barrel rollers. This protects the floors of plants, storage areas and shipping platforms from cracks and other breakages. Too, L-S trucks feature handlehead controls; this enables the JackStacker user to do his work efficiently even in the most cramped areas. The "lubricated-for-life" element, also saves U. S. Rubber an interesting sum in maintenance costs. Prior to shipment, the truck is fitted with bearings at all friction points, especially lubricated and then, factory-sealed. U. S. Rubber's JackStackers don't have to be placed on the grease rack at any time for the periodic lubrications common to many handling trucks. Approximately 40 cents on the dollar may be saved this way.

The United States Rubber Co. employs 31 of the Lewis-Shepard trucks in both their bogie wheel and tire production and materials handling divisions. They include the previously mentioned JackStackers, JackLifts and JackTractors. All of these have well-rated, inexpensive electric motors and are walkie type trucks. A JackStacker performs a bevy of duties for the tire production and materials handling divisions of the company. One of these duties is the transfer of huge pallet loads of tubes directly from delivery trucks to trailers backed up to the dock (Figure 2), later to be assembled in tires for original equipment customers. These loads, weighing 1,620 pounds, consist of 18 inner tube cartons. Easy flow of these 42 x 51 inch pallets assures management of competence in shipping. Before the truck was introduced at the company's Detroit plant, the work had been done by hand, wasting precious time and unavoidably battering corrugated cartons.

*FIG. 3—Photograph shows a JackTractor hauling a side-by-side double line of tire carrying trailers 125 feet long. Each trailer carries up to 40 tire units.*

In the tire production and materials handling divisions, JackTractors haul 125-foot trailer trains (Figure 3). The trailers are doubled, however, and load lengths are actually 250 feet. With each trailer carrying up to 40 tire units, it can be noted quickly that these double trailers can transport extensive quantities of material on every trip.

With their materials handling system composed of such a large variety of Lewis-Shepard walkie electric trucks in their tire production, materials handling and bogie wheel programs, U. S. Rubber actually obtains more per handling dollar than ever experienced previously. Additionally, the complete materials handling process in use at the U. S. Rubber Detroit plant will have paid for itself completely at the close of 52 weeks of operations. This proves the earning capacity of rubber plant materials handling when the appropriate scheme of action and the requisite equipment is put into use.

## *Coming Next Month...*

**"The Morphology of New Synthetic Elastomers"—by Ernst A. Hauser, Massachusetts Institute of Technology, Cambridge, Mass.**

Report of a study on the morphology of natural Hevea rubber, balata and gutta-percha. The morphology of a standard butadiene-styrene copolymer is compared with that of a similar copolymer produced by the use of the alfin catalyst. The study indicates that the morphology of Firestone's Coral rubber is more or less identical with that of natural Hevea rubber.

**"A New Method for Determining the Dynamic Mechanical Properties of Rubber"—by R. E. Morris, R. R. James and C. W. Guyton, Rubber Laboratory, Mare Island Naval Shipyard, Vallejo, Calif.**

Discussed in this article are the dynamic mechanical properties of rubber at high frequencies of vibration. The paper deals with a modification of the bar transmission method whereby the resonant frequency and dispersion of the vibrational energy above and below the resonant frequency are measured.

**"Rotational Molding of Hollow Vinyl Plastisol Units"—by T. A. Miller, President, Akron Presform Mold Co., Cuyahoga Falls, Ohio.**

How rotational molding works and how it find application in the vinyl plastic field in the molding of such hollow items as toys, syringes and bath shoes is discussed and outlined in this illustrated article. Such operational problems as moisture and oven temperatures are discussed.

**"How Carbon Black Is Handled at Goodyear's Topeka Plant."**

Discussion of cost cutting in materials handling operations. The problem in this case was conveying six different types of black from delivery at the plant rail siding to the processing points.

**Plus several short practical articles.**

# How Power Brushes Solve Complex Production Problems

POWER brushing, once considered an auxiliary operation by manufacturers of rubber products, is today an efficient cost saving production tool. Not only do power brushes offer versatility to the manufacturer but these brushes and brushing equipment constitute important production tools because they fit into those manufacturing operations where the ratio of labor costs to other production costs is high. With well-designed machines capable of feeding and guiding the work-pieces, rate of production finishing is comparable to other related manufacturing operations.

For example, an application of power brushes to the complex problem of removing rubber flash and film from track pins for army tanks saved many hours of production time. The problem presented to brushing specialists of the Osborn Manufacturing Company, Cleveland, Ohio, was to remove the rubber flash and film from six bearing and electrical ground sections of track pins after molding. It is necessary to remove this material to assure good electrical contact for static elimination.

A special brushing machine was designed and constructed that removes the excess rubber from all six areas simultaneously in a few seconds. Six .014 wire brushes are mounted and spaced so that all the operator need do is feed the track pin into position (Figure 1). The pin is revolved in a counter direction to the rotation of the brushes. It is then automatically topped out of position as the next pin is fed into the machine. The job is done quickly and economically. The clean-up is complete, no other work must be done to expose the same metal for perfect electrical contact (Figure 2).

Another power brushing operation, this one to roughen the rubber back of decorative plastic laminate, developed by a midwestern mechanical rubber company, with the aid of Osborn's Technical Department, is also resulting in large time, labor and cost savings. This machine, the first of its kind, replaces previous manual operations necessary to prepare the laminate for a permanent cement anchor. Fine grooves, which are cut into the rubber with the fine wire brush, provide a base into which the cement can anchor. In addition to the final product being more uniform and of a higher quality, the time and cost of manual roughing is eliminated—a considerable savings in these days of high labor costs.

An additional advantage of this power brush operation is the close tolerances it is able to maintain. The thickness of the laminate is held to within .002 since the only manual labor involved is feeding the three and one-half feet by seven feet plastic laminate sheets into the machine.

The first sheet is manually fed into the brush ma-

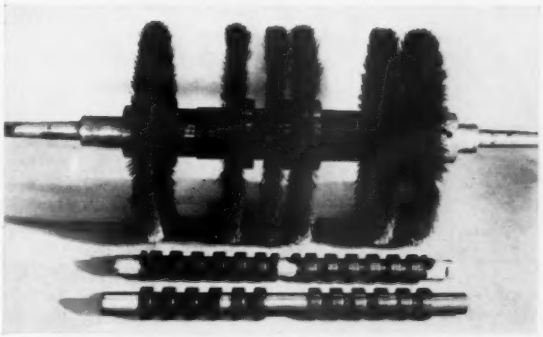


*FIG. 2—The construction of the arbor with six wire brushes spaced to fit into the track pin grooves where rubber is to be removed.*

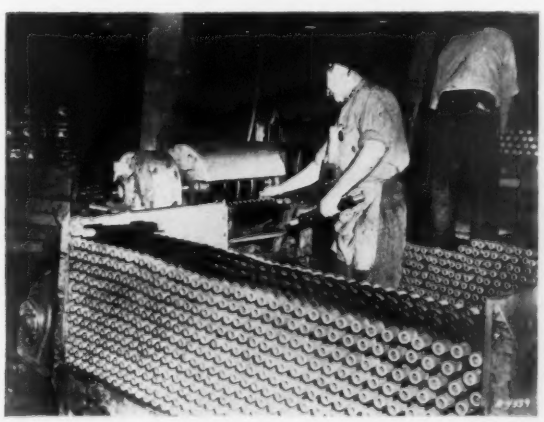


*FIG. 1—Wire brushes mesh with each of the six sections of these molded track pins for army tanks where flash and film are to be removed.*

*FIG. 3—The grooves of this decorative plastic laminate are cut and the rubber surface roughened with a special Osborn brush filled with fine wire.*

chine. Masking tape is then used to bind the other sheets, butt end to end, so that after the machine has started the feeding is continued automatically and controlled by feeder rolls in the machine that maintain a constant speed of 45 inches per minute.

An Osborn Heli-Master brush, 52 inches long with a 15-inch diameter and filled with .005 fine wire, is used to cut the grooves and roughen the rubber surface. This brush rotates at 1200 revolutions per minute. A back-up roll beneath the sheet maintains the proper pressure of work against the brush face and controls the close tolerance (Figure 3).

A device to trim the wire brush surface is incorporated in this machine to maintain its cutting effectiveness. At pre-determined intervals, the brush is rotated in reverse against a stone block. The ends of the fine wire brush are thus returned to original sharpness after having been dulled through constant use.

The cleaning of the fine rubber dust created by the roughing action is also accomplished by an Osborn power brush. An Osborn Master Strip Rotary brush, 52 inches long with a 15 inch diameter and filled with .016 nylon, brushes the laminate sheet as it emerges from the roughing brush. The fine rubber is thus brushed into a forced air ventilating system and removed from the operation.

## Elastomer-Processed Vinylfoam Increasing in Volume

AFTER several years of laboratory and sales development testing, Vinylfoam is now being produced and marketed in substantial volume for many consumer and industrial goods. The Elastomer Process of producing Vinylfoam was introduced in early 1952, and has gained such momentum that today some twenty-five companies have taken out production and experimental licenses from Elastomer Chemical Corp., Newark, N. J., including the B. F. Goodrich Chemical Co.

The process is done mechanically as compared to the common practice of forming foam chemically with a chemical blowing agent incorporated in the vinyl plastisol itself. A Girdler Votator Foamer continuously mixes the plastisol with carbon dioxide gas, and this metered mixture sprays through a hose and nozzle into open or closed molds, or onto a conveyor belt which takes the foam into a dielectric oven for curing. Sheet stock up to 4 inches in thickness and in widths up to 60 inches can be produced continuously using this method. Densities ranging from 6 to 30 lbs. per cu. ft. can be easily produced, and a density of 3 lbs. per cu. ft. has been reached by special compounding and laboratory equipment.

According to Goodrich Chemical, there are many advantageous properties obtained with Vinylfoam formed from a plastisol based on Geon 121. These include: wide color range; wide range of densities and compression; superior resistance to aging; non-flammable; no "bottom-out"; no sag or lump; superior tensile and tear resistance; good abrasion resistance; easier to produce than other type foams; superior resistance to acids, alkalis, greases, oils and chemicals; resilience may be varied greatly; readily molded without excessive scrap waste; competitive in price with foam rubber and lower than many other foamed plastics.

Vinylfoam is said to have a tremendous potential in transportation, furniture and many other applications calling for the aforementioned properties. It can be used in the home as rug underlay or backing, cushions, bath mats, slippers, and in automobiles as crash pads, arm rests and heat and sound deadening insulation.

One of the fabricating techniques expected to help the rapid commercialization of Vinylfoam for the above applications is electronic heat sealing. In all types of electronic heat sealing, the high frequency heat brings the materials to their softening temperature, causing two or more layers of material to flow and thus homogenize with each other. Simultaneously, the ram of the press exerts pressure on the laminated structure. This combination of heat and pressure causes a bonding of the various layers at all points of seal. When the ram of the press raises, the materials cool almost instantly at the point of seal.

When electronically heat sealing Vinylfoam, a tearseal die not only shapes the article and performs the sealing operation, but also cuts through the material so that no further cutting operations are necessary to complete the end product. The finished articles are separated from the sheets in a simple tearing operation quite similar to tearing along a perforated line.

Most heat-sealed articles in the past have been made by sealing together two or more layers of vinyl film. This technique has been used to manufacture articles such as raincoats, tobacco pouches, shower curtains, wading pools and toys. Many of these are heat-sealed in the flat state and then inflated to create a three-dimensional effect. Another method commonly used to create a three-dimensional effect is to put a vinyl-impregnated cellulose material between a surface layer of heavy gauge vinyl and a backup layer of thin gauge vinyl, and then heat sealing the components together. Such quilted plastics are sold as yard goods for further conversion to consumer articles.

However, none of these methods give sufficient three-dimensional effect to provide real cushioning value. But, by selecting the proper thickness and density of Vinylfoam as the inner layer, it is possible to make articles with a wide range of resilience. Combining vacuum formed film materials with heat-sealed Vinylfoam also presents possibilities for many future applications.

Among the many combinations and techniques utilizing electronic heat sealing are the following:

1. An embossed, heat-sealed item consisting entirely of foam. Such products as formed sponge, bath mats, toys and other novelty items are made this way.

2. Articles consisting of a single layer of vinyl film and a layer of Vinylfoam. This technique is particularly satisfactory for brushes, sponges and other articles where vinyl film can be used to make a handle or surface to grasp the items.

3. Thin sheets of Vinylfoam with vinyl film top and bottom is used more for improving and increasing the depth of design and cushioning values of existing products rather than for the creation of entirely new products. The texture of deeply embossed wallets and book bindings is enormously improved by using Vinylfoam in this manner.

4. Heat sealing Vinylfoam to one layer of textile fabric is used to make shoulder straps, brassieres, and other articles which require a textile rather than a film surface.

# *Editorials . . .*

## Synthetic Specifications

THE growing pains of the synthetic rubber industry were the subject of an editorial in a recent issue of the *Journal of Commerce*. The editorial pointed up the fact that the transition of the industry from government to private hands resulted in a number of adjustment problems that are still waiting for solution and warned that unless something is done about these problems in the near future the industry may well head into a production and distribution tangle that is likely to prove costly for makers and users alike.

Principally, the editorial was concerned with the fact that although private industry started its synthetic rubber operations under an arbitrary twelve-month price freeze there is no longer a satisfactory source of information on the market price of synthetic rubbers. It attributes this situation to the lack of uniform specifications and urges that early action be taken in this respect. Since past experience has shown that the creation of industry-wide specifications generally depend on the existence of an industry-wide association, it recommends that the synthetic rubber producers form such an association. It also stresses the fact that an industry-wide organization can also be invaluable in other directions.

The need for synthetic rubber specifications was recognized by the consuming industry immediately upon transfer of the plants to private industry. In recognition of this need, Committee D-11 on Rubber and Rubberlike Materials of the American Society for Testing Materials quickly organized Subcommittee XIII to deal with the problem. This subcommittee, under the chairmanship of B. S. Garvey, Jr., has already held several meetings and has appointed a number of sections to treat with special aspects of the over-all problem. At its initial meeting, held last May, the subcommittee voted to recommend that the FFC test methods, as outlined in the specifications of April 15, 1955, be used until standard ASTM specifications are made, and further that six specific FFC tests, four chemical and two physical, be reviewed and submitted as quickly as possible to ASTM as standards. Such moves take considerable time, since standard society procedures must be observed.

The question of specifications for the privately-produced synthetic rubbers is far more complex than it sounds. The producers, still feeling their way and sounding the market, with substantial investments at stake, are not too eager to accept specifications which are too tight. The consumers, accustomed to rigid regulation over the past decade, would like to have specifications closely comparable to those which pertained during the government reign. Further, they would like to have the polymers interchangeable, regardless of source, and would welcome a coding system of some kind which would spell out such interchangeability. As a matter of fact, such a coding system has been written out and recommended by Section VII of Subcommittee XIII of ASTM Committee D-11.

The synthetic rubber producers are not to be condemned for failing to welcome official specifications with open arms. They are following typical business initiative and business caution. Each producer is eagerly seeking some competitive angle which will make his product different from all the others. Each one is carefully studying current production procedures with an eye toward improved polymers. Since manufacturing methods in any industry are usually closely-guarded secrets, the synthetic rubber manufacturers object to any specification which would reveal production details. It will be recalled that the GR-S specifications gave such details, including degree of conversion; type of catalyst, modifier and shortstop; temperature of reaction, etc.

As far as we can determine, the synthetic rubber manufacturers do not have any strong objections to specifications which would be based on "objective tests," the type which could be run in any rubber laboratory and which would not depend on any knowledge of the manufacturing processes. The major difficulty with this point of view is that so-called "objective tests" adequate for classification purposes without some knowledge of the manufacturing method do not exist. Under government operation this difficulty was overcome by specific control of the manufacturing methods. This situation merely emphasizes the difficulties facing any group attempting to set up specifications.

In our opinion, the synthetic rubber manufacturers should accept the former GR-S specifications, with some minor modifications, until future policy can be determined. It would be relatively easy to maintain such specifications at present and drop them later if desired. On the other hand, if they are dropped now it will be a long and difficult task to get any specifications adopted in the future. Remember, one of the real advantages of synthetic rubber has been uniformity and such uniformity should be maintained even in the face of controls. In any event, any system of specifications which may be adopted must be flexible enough to permit and encourage improvements in the polymers.

# Highlights Sidelights *of the News . . .*

January, 1956

On December 20th the Rubber Producing Facilities Disposal Commission announced that it had signed an $11,000,000 contract with Goodrich-Gulf Chemicals, Inc., for the sale of the government-owned synthetic rubber plant at Institute, West Va. . . . In consideration of the fact that Goodrich-Gulf already controls 12.3% of the synthetic rubber producing capacity, it is expected that some Congressional objections to the proposed sale may develop . . . If Goodrich-Gulf secures the Institute plant it will control just about 20% of the producing capacity . . . It will also mean that the "Big Four" will control about 70% of the capacity (page 575).

According to current reports, the Federal Trade Commission will soon receive for decision a report on its investigation into rubber and oil company cooperative sales practices . . . The investigation was one of the most comprehensive in FTC history and took six years to complete . . . Under current practice, FTC will either issue a complaint against the companies involved or drop the case . . . The investigation has centered on over-riding commissions alleged to have been paid to oil companies by tire companies in return for promoting tire, battery and accessory lines in oil company stations (page 577).

The year-end report of the Rubber Manufacturers Association points out that rubber consumption in the United States in 1955 ran more than 22% over consumption in the previous year . . . It was also reported that the volume of business in the non-tire segment of the industry passed the $2,000,000,000 mark for the first time in history . . . RMA reports that the composite view of industry experts is that 1,480,000 long tons of new rubber will be consumed in the U. S. in 1956 . . . World new rubber consumption in 1956 is estimated at 2,980,000 long tons (page 581).

The special eleven-member advisory commission appointed by the National Science Foundation to develop recommendations on the future role of the federal government in basic research on synthetic rubber has recommended that the government end its contract supporting synthetic rubber research at the University of Akron . . . The recommendation, if accepted, gives the University the choice of leasing the laboratories without federal subsidy or selling them to a private company (page 576).

General Tire has announced that the nation's first postwar, privately-financed and completely integrated synthtic rubber operation will be built near Odessa, Texas . . . Production of synthetic rubber at the new facility is expected to start about July 1, 1957 . . . The new copolymer plant will have an annual capacity of 40,000 long tons (page 576).

# Review and Preview

*A Compilation of Year-End Statements and Particularized Comments on Various Segments of the Rubber Industry Written Especially for* RUBBER AGE

## *Opinion . . .*

Rubber industry sales in 1956 could go as high as $5,750,000,000—*Humphreys* . . . Natural rubber industry confident—*Bugbee* . . . Polyethylene capacity to reach 600,000,000 pounds in 1956—*Miller* . . . 560,000 tons of rubber will be used in non-tire rubber products in 1956—*Robins* . . . A year of high level production and continued stable employment—*Firestone* . . . 1956 may be another record year—*Weeks* . . . International business outlook encouraging—*O'Neil* . . . Scrap rubber does not have very bright prospects for the coming year—*Tanney* . . . Rubber chemical sales will remain at the 1955 level rather than continue to climb—*Vila* . . . The textile industry is in a healthier position than it has been for some years—*Avary* . . . Between 300,000 and 320,000 long tons of reclaim will be used in the U.S. in 1956—*Trimble* . . . Replacement tire sales in 1956 may exceed 1955—*Litchfield*.

## *Consensus . . .*

Most business leaders and economists see no sign that the business boom is nearing an end. Consumer demand, which was the major factor reversing the post-Korea slump, remains strong. Huge expansion programs in steel, aluminum and automotive products, now in the offing, will add to the momentum. In the year just ended, the economy expanded to new high levels of production, employment and income. At the year end, the growth pattern still showed a rising curve. The gross national product rose to $387 billion in 1955 and the possibility exists that it may rise to $400 billion in 1956. As for the rubber industry, the trade is of the opinion that production and sales of rubber products during 1956 may approach levels nearly as high as those reached in 1955. It is estimated that the United States will consume about 1,465,000 long tons of new rubber in 1956, and at least 62% of this total will be synthetic rubber. Ample supplies of synthetic should be available in 1956 as production facilities are expanded.

## *Future . . .*

In every past decade rubber usage has doubled. It is not expected that 1960 will double 1950's world consumption of 2,280,000 tons. But it has been estimated by the Rubber Manufacturers' Association that by 1960 consumption will reach 3,500,000 tons. Other industry forecasts have placed consumption in 1965 at 4,300,000 tons. With a steady increase in overall rubber consumption sparked by growing automobile production and the multiplying non-tire uses of rubber, the statistical expectation seems to point to sufficient demand to take care of all the natural and synthetic rubber that can be produced at a logically competitive price. In England, rubber technicians have developed rubber tires for trains; in France, the same type of tire for subway cars. In the U. S. and all over Europe, work is proceeding on the use of rubber in roads. These are typical of the advances in rubber which augur well for the future of the industry.

## *Continuing Stability Seen.....*

H. S. FIRESTONE, JR.

THE year 1955 was one of record production and sales for the rubber industry. For the second time in its history, Firestone sales were more than one billion dollars. Major expansions of producing facilities for synthetic rubber and chemicals and for the manufacture of tubeless tires, foam rubber, industrial and mechanical goods products characterized the year for the company. The purchase and expansion by private industry of the synthetic rubber producing plants formerly owned by the Government was one of the most significant developments in 1955.

In the field of research, the release of information by Firestone on the discovery and production of a new type of synthetic rubber was hailed by Government and industry leaders. This new rubber closely approaches the physical properties of natural rubber and has many of the advantages of natural rubber for truck tires that heretofore have been impossible to duplicate in synthetic rubber.

By substantially increasing the output of synthetic rubber during 1955, the industry was able to provide its products to customers at much lower costs than would have been possible if it had been forced to rely upon natural rubber alone. During the year the price of natural rubber fluctuated from a low of 29 cents per pound in March to a high of 49 cents per pound in September, while the price of synthetic rubber held constant at 23 cents per pound.

The outlook for new and expanded use of rubber products is most encouraging. Plans are being made by Firestone to expand raw material and finished product manufacturing facilities during 1956 to meet the steadily increasing demand for all rubber products.

Annual capacity of Firestone's synthetic rubber plants is being increased to 190,000 tons from 130,000 tons, or 46 per cent, and additional expansions are planned. The Company soon will begin construction of a new plant in the Gulf Coast area to produce butadiene at the rate of 40,000 tons a year. This will provide Firestone with a substantial part of its requirements for this principal raw material used in the manufacture of synthetic rubber.

Major additions were made to most of our plants at home and abroad. Expanded capacity and large-scale improvements in processes and equipment were provided for the manufacture of tires, Foamex foamed rubber, mechanical rubber goods, steel products, defense products, Velon plastics and Exon basic resins for plastics. Additional warehouse facilities were provided at our Des Moines, Pottstown and Brentford factories, and new warehouses were built or are nearing completion in our Cleveland, Charlotte, Oklahoma City, Phoenix, Birmingham, Dallas and Memphis sales districts, and in Havana, Cuba. These will add to the efficiency and economy of our distribution.

The demand for foam rubber for upholstery and transportation uses is increasing rapidly. New applications of plastic foam, improvements in latex base paints, increased use of rubber air springs for buses, trucks and trains, and the development of improved types of resins and synthetic rubber indicate that greater diversification lies ahead for most segments of the rubber industry.

As a result of the high level of automobile production during the past few years, there will be more motor vehicles in use in 1956 than at any other time in history. Therefore, the market for replacement tires is expected to increase. Manufacturers of automotive vehicles also anticipate an excellent year, which indicates a large original equipment market for our products. Opportunities for the sale of our many other products also appear to be most favorable.

For these reasons, we are looking forward to 1956 as a year of high-level production and continued stable employment.

*Harvey S. Firestone, Jr.*

*Chairman, Firestone Tire & Rubber Co., Akron, Ohio*

## *Sees Sales at $6,000,000,000.....*

WILLIAM O'NEIL

WHAT are the prospects for the rubber industry in 1956? I foresee the greatest year in the industry's history with over-all sales likely to top the $6 billion mark for the first time. An unprecedented demand for replacement tires for automobiles, trucks and off-the-road vehicles will challenge the industry's production facilities in addition to supplying the high-level needs of automotive and truck companies now manufacturing vehicles at a 130,000 to 135,000 units per day.

The millions of new automobiles and trucks put into service during 1953, 1954 and early in 1955 will need replacement tires during 1956. These automobiles and trucks are being driven greater miles than ever before at greater speeds. The factor of safety alone necessitates tire replacement. As the originator of the 14-inch diameter tire, General Tire is ready to produce the smaller sized tire if and when it becomes the original equipment size tire on new automobiles. The change is likely to come late in 1956 with the first of the new 1957 automobiles. We introduced our Jumbo 14" tire back in 1932. We have all the engineering data, the test records, and the equipment to produce this size tire which is now being recognized for the safety factors we originally advocated.

New developments of new items, particularly in plastics and other forms of chemistry, will stimulate sales during 1956. The new plastic products, like new upholstery, new wall-covering, new floor-covering, new luggage, brand new furniture with more stylish eye-appeal and better wearing qualities, are certain to attract the buyer.

While we look for a high level operation over-all in the rubber industry, we are anticipating gains greater than the industry average because of expansions we have undertaken recently. Our expansions will enable us to catch up to a product demand which has been in excess of our production in 1955.

Almost every day new uses are being developed for plastic materials in such fields as automotive, furniture, luggage, household and soft goods, and the growth potential in this phase of our business is tremendous. Expansion of our $6 million chemical plant at Ashtabula, Ohio, is necessitated by the demand our own developed uses have created for these resins.

The international business outlook is also encouraging. All of our plants outside of the United States are geared up for capacity production during 1956 following very successful operations in 1955.

*William O'Neil*

*President, General Tire & Rubber Co., Akron, Ohio.*

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## *Predicts Higher Sales.....*

H. E. HUMPHREYS, JR.

UNITED States Rubber Co. expects its sales will pass the billion dollar mark in 1956 for the first time in its history. This sales volume will represent a gain of between 8 and 10 per cent over 1955. The 1955 sales of over 900 million dollars will set a record. We expect increased business in replacement passenger car and truck tires. Our business is expanding in plastics, plastic products, chemicals and synthetic rubber. We look for continued growth in footwear, foam rubber, industrial rubber goods, textiles and foreign business.

U. S. Rubber expects to spend about 36 million dollars in new plants and equipment in 1956, which is about a million more than 1955 and 5 million dollars more than the previous record of 31

million spent in 1954. The rubber industry which set a new sales record of 5¼ billion dollars in 1955, should exceed that record in 1956. Sales could go as high as 5¾ billion dollars.

We estimate that 1,500,000 long tons of rubber will be consumed by the industry in 1956, about the same as 1955. The general price level for rubber products increased slightly in 1955 due to higher raw material and labor costs. These higher prices, which will be reflected throughout all of next year, will contribute to the expected dollar sales increase although rubber consumption will remain about equal to 1955. The proportion of synthetic rubber used by the industry will continue to rise, probably reaching 65 per cent in the latter half of next year. About 60 per cent of total rubber consumption was synthetic in 1955.

Industry demands for synthetic rubber have far exceeded plant production capacities, due partly to high prices for natural rubber and partly to the superiority of synthetic in many applications. Synthetic rubber demand is expanding tremendously in foreign markets as well as domestic. Most of this demand is from such European countries as England, Germany, France and Italy. Consumption of synthetic rubber abroad next year will exceed 260,000 tons and could conceivably reach 300,000 tons despite the shortage of dollars. This compares with only 155,000 tons consumed abroad in 1955.

We look for passenger car and truck tire sales of approximately 103½ million units in 1956 compared to 108½ million units in 1955. Replacement passenger tire sales will be about 2 per cent higher in 1956 and should total about 51 million units. Truck tire replacement sales will be lower in 1956 by about 2 per cent and should total about 8½ million units.

Sales of industrial rubber products should continue at a high level following the high level of over-all industrial activity. Sales of foam cushioning should continue to increase with the biggest volume sold to the automotive and furniture industries. Mild winters have brought about a decline in sales of waterproof footwear, but the growing demands for rubber-soled canvas shoes for sports and casual wear have more than offset this decline.

*H. E. Humphreys, Jr.*

*President, U. S. Rubber Co., New York, N. Y.*

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## *Sees Adequate Synthetic Supply.....*

W. S. RICHARDSON

IT is our present estimate that the United States will consume approximately 1,465,000 long tons of new rubbers, crude and man-made, in 1956 with at least 62 per cent of this total being American-made rubbers. Supplies of American-made rubber will be adequate during 1956 to fill the increasing demands for the material as production facilities, now under private ownership, are being expanded and improved. Reviewing the tire manufacturing segment of the rubber industry, which established record sales of 113,000,000 units in 1955, we believe that tire sales in 1956 will total about 110,000,000 units, exceeding the 100,000,000 mark for the third time since 1950.

Sales of replacement tires are expected to be about 1,000,000 units more than the 50,000,000 sold in 1955, while total passenger car sales,—replacement plus original equipment,—may decline to 90,000,000 from the 1955 total of more than 93,000,000 units.

The decision of the automotive industry to adopt tubeless tires for original equipment on 1955 models highlighted a program launched by B. F. Goodrich with the introduction of the first tubeless tires for passenger cars in 1948 following the invention of the new tire the year before. Since then our Company has expended more than $55,000,000 in the invention and development of tubeless tires.

Large truck tires, until 1955, required tree rubber to assure acceptable performance, virtually the only type of tire in which available man-made rubbers have not been entirely satisfactory. Scientists of Goodrich-Gulf Chemicals, Inc., owned half by the Gulf Oil Corporation and half by The B. F. Goodrich Company, succeeded in reproducing the true molecule of tree rubber in 1954 in the B. F. Goodrich Research Center, Brecksville, Ohio.

During the past year B. F. Goodrich produced truck tires in large sizes for highway service, made entirely of the synthetic duplicate of tree rubber, that are now giving mileage and overall performance comparable to truck tires made entirely of crude rubber.

Goodrich-Gulf Chemicals, Inc., took title this year, at a cost of $39,500,000, to government facilities in Port Neches, Texas, for the production of man-made rubber and its components. Goodrich-Gulf Chemicals, Inc., has begun construction of pilot plant facilities at Avon Lake, Ohio, to produce the new man-made rubber which synthetically duplicates tree rubber. In December, 1955, the Government announced that Goodrich-Gulf Chemicals, Inc., was high bidder for the rubber-producing facility at Institute, West Va., which has been in standby since August, 1953.

Planting of rubber trees began this year on The B. F. Goodrich Company's 600,000 acre land concession in Western Liberia, Africa. Construction of new tire and tube manufacturing plants in Peru and in Manila, the Philippines, also started in 1955 with B. F. Goodrich as a minority stockholder in both companies which will employ BFG patents and technical assistance.

British Geon Limited increased its capacity and its output of vinyl plastic materials during 1955 and Japanese Geon Company, Ltd., operated at double its 1952 capacity. Geon do Brasil in Sao Paulo and Geon de Mexico in Mexico City began production during 1955. Associate companies of B. F. Goodrich in France, Holland, Mexico, Sweden, England and Colombia during 1955 substantially expanded their facilities for the manufacture of tires, tubes and other rubber products.

*W. S. Richardson*

*President, B. F. Goodrich Co., Akron, Ohio.*

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## *Envisions Banner Year.....*

THOMAS ROBINS, JR.

THE financial editors of several publications have requested my views on the business outlook for 1956, particularly with reference to the rubber industry. I believe business in general next year will equal and perhaps surpass the record levels established in 1955. As for the non-tire segment of the rubber industry, which is the principal industry of which Hewitt-Robins is a part, I look for sales of about $2.2 billion, a gain of about 5 percent over 1955. This is about 53 per cent of the industry's total sales.

Sales of non-tire rubber products have grown faster than tire sales in recent years and this trend is likely to continue as a result of the development of new products and the steady rise in consumption of such standard items as conveyor belting, foam rubber, rubber floor tile, industrial hose and rubber footwear.

An estimated 560,000 tons of rubber will be used in non-tire rubber products in 1956, about 38 per cent of the total rubber expected to be consumed in the United States. Non-tire products as a group require less raw rubber per dollar's worth of finished goods manufactured because most of these products contain a higher proportion of textiles and other materials than do tires.

One of the chief problems of the rubber industry in 1955 was the shortage of natural rubber latex and a consequent doubling of its cost. Because of the many economic and political factors involved, it is difficult to predict how much improvement in this problem we may expect next year but I do feel that the worst is behind us.

*Thomas Robins, Jr.*

*President, Hewitt-Robins, Inc., Stamford, Conn.*

## *Chemical Outlook Stable.....*

GEORGE R. VILA

LAST year was a banner year for rubber hydrocarbons and, consequently, for rubber chemicals. Consumption of rubber hydrocarbons was approximately 24 per cent above 1954, and rubber chemical sales which parallel rubber usage rose proportionately. The outlook for 1956, however, is for rubber chemical sales to remain at the '55 level rather than continue to climb.

Auto production is the key factor in rubber chemical sales because the largest use of the chemicals is in tires. It was 1955's booming auto production, which almost hit 8 million units, that was primarily responsible for soaring rubber chemical sales in 1955. This year, with car production expected to fall below the height reached in 1955, tire casings produced are expected to decline about 5 per cent. Hence, rubber chemical sales for non-tire uses must be expanded to keep consumption at the 1955 level.

An increase in the use of synthetic rubber, which requires a higher percentage of rubber chemicals than natural rubber, is expected to take up some of the slack caused by a fall-off in tire production. While total rubber consumption in 1956 is expected to be about equal to the amount consumed in 1955, the percentage of synthetic rubber used promises to climb from roughly 60 per cent last year to about 65 per cent in '56.

Another factor that should bolster sales in '56 is the anticipated increase in mechanical rubber goods, foam rubber and other non-tire rubber products which are growing at a brisk rate.

The rubber industry's move away from acidic carbon blacks and increasing emphasis on faster processing to absorb mounting costs, is accentuating the need for accelerators with a more favorable cure-burn ratio. Better chemicals of this type are appearing on the market all the time.

There is a trend in synthetic rubber manufacture to use more non-discoloring stabilizers during production to make synthetic rubber more versatile.

Weighing all these factors, it appears that increasing production of synthetic rubber and continued growth of non-tire rubber products will about offset the expected decline in tire production so far as rubber chemical usage is concerned.

*George R. Vila*

*Assistant General Manager, Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn.*

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## *Bright Future Foreseen.....*

P. W. LITCHFIELD

BY every measurement, 1955 was a record year for business, with everything climbing and growing — payrolls, employment, production and sales. All of the factors which made 1955 a banner year are still with us as we enter 1956. Despite the fact that it is an election year and that, traditionally, this brings some doubts and misgivings in business quarters, there is reassurance from the fact that underlying everything there is a strong conservative trend.

Our great nation has reached a new plateau of prosperity, giving 165 million Americans the highest standard of living the world has ever seen. In large measure responsible for this great progress has been a substantial improvement in the business climate over the past few years when our economic development has surged forward, in the face of forecasts of a post-war depression. With continued improvement in the climate for our free economy, we have every reason to believe that we can go on to even greater progress.

Against this backdrop of a booming American economy and expanding business world-wide, business in general and the rubber industry in particular face the future with optimism.

The best barometer of activity in our industry is new rubber consumption. In 1955, the industry in the United States used a record of 1,510,000 long tons of new rubber (natural and synthetic). Our conservative estimate for 1956 is 1,475,000 long tons. If the automobile industry continues at the present rate, we will process more new rubber in 1956 than we did in 1955. The year now ended has been a banner one for auto, truck and farm tire replacement sales, as well as for original equipment tire shipments.

Replacement tire sales in 1956 are expected to exceed 1955, because there will be more vehicles in operation. The question, "How many passenger cars will be built in 1956?" is very important, because the rubber industry provides five tires for every car built. Industry production and shipments of hose, belts and other non-tire rubber items are expected to exceed 1955, due to the high level of production, construction and the generally expanding economy.

With sales exceeding the billion-dollar mark for the first nine months, 1955 will be a record year for The Goodyear Tire & Rubber Company. Looking ahead over the next ten years, we see the American economy expanding to new heights and bigger markets developing overseas.

We are making our plans accordingly, with the greatest plant expansion program in our company's history. There is hardly a Goodyear plant that does not have an expansion program under way or planned for the near future. This capital expenditure program now adds up to the impressive total of $114,000,000. Our business is expanding in all of our diversified lines—tires, industrial products, aircraft products, films, foams and flooring, chemicals, shoe products, steel products.

Great as are the prospects in the domestic market for our goods, we believe the field of our foreign operations will grow even faster, and we are currently expanding our overseas plants and building new plants in Scotland, Venezuela, the Philippine Islands, Colombia, and Melbourne, Australia.

All over the world, incomes and standards of living are rising and, as a consequence, our sales of tires, industrial products, chemicals, soles and heels and other products are growing. We are expanding our production and sales facilities in line with this trend.

*P. W. Litchfield*

*Chairman, Goodyear Tire & Rubber Co., Akron, Ohio*

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## *Cites International Factors.....*

E. G. HOLT

THE surprise element of the 23 per cent United States increase in the consumption of new rubber in 1955 was the primary factor in the problems of the world rubber industry during the year. The insistence of United States manufacturers on enough natural rubber to maintain its usage near 40 per cent of their total monthly consumption called for all the natural rubber that could be obtained, and the buying pressure on the market pushed prices upwards. The rising and high price of natural rubber was favorable to its production, which was near the maximum considered attainable currently.

Spasmodic takings of natural rubber by Russia and Red China, which were especially heavy in closing months of 1955, made the market even tighter. Lesser factors were the expected continued increase in rubber consumption in foreign free world countries, the reduced domestic use of Butyl which put an added strain on supplies of natural and S-Type synthetic rubber, uncertainties concerning the amount of natural rubber produced in Indonesia and consumed elsewhere owing to inaccuracies of Indonesian statistics, and questions regarding the production of S-Type synthetics stemming from the trans-

fer of the facilities from Government to private ownership and the statutory provision for placing unsold plants in standby.

These elements faced the domestic rubber industries in the United States with an immediate and severe test of their efficiency and adaptability in the absence of any Government control over consumption.

The situation could be met only by increasing the production and use of synthetic rubbers. Government production of GR-S, rising at the end of 1954, was rapidly expanded to the rated capacity of the operating plants during the four months of Government ownership in 1955.

Congress promptly provided for the continued operation and negotiations for sale of the Baytown, Texas, copolymer plant, and the plant was sold in July. After the other operating S-Type plants were transferred to private owners in late April, production was increased by arranging for supplies of feedstocks and removing bottlenecks. The production of neoprene and N-Type synthetic rubbers was also increased.

With rising prices for natural rubber, and with supplies of lower priced synthetic available in substantial quantity from the United States, foreign manufacturers of rubber products perhaps for the first time came to realize that they must arrange for and use much more synthetic rubber or pay penalty prices for natural rubber. In this respect, 1955 marks a turning point in the international rubber situation.

The prospect for 1956 includes a further rise in foreign consumption, larger imports of natural rubber into iron curtain countries than in 1955, no 1956 increase over 1955 in world production of natural rubber, and a mild industry-predicted decline in United States consumption. The year starts with lower stocks of natural rubber than a year earlier, but with a far higher rate of production of synthetic rubber with the probability that the Institute, West Virginia, copolymer plant will be brought into production, and that the capacity of presently operating synthetic plants will be increased somewhat during the year. No great increase in production of synthetics elsewhere in the free world is scheduled for 1956.

The possibility that United States exports of S-Type rubber can be increased substantially is clear. To the extent that this occurs, foreign demand for natural rubber will be reduced. If world natural rubber production is maintained, the imports into the United States should also be maintained at a rate permitting its continued 40 percent use by manufacturers in this country; this depends on the trend of natural rubber prices. If these things do not happen, American manufacturers should be prepared to change their compounds so as to use lower percentages of natural rubber.

*E. G. Holt*

*Assistant Director for Rubber, Chemical and Rubber Division, Business and Defense Services Administration, Department of Commerce, Washington, D. C.*

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## *Latex Future Bright.....*

ARTHUR NOLAN

THE year 1955 saw total rubber latex consumption in the U.S.A. hit a new high, probably over 20% higher than 1954's record high. Hevea latex, while it gained in total consumption, lagged in percentage gain, by reason of too high prices prevailing during most of the year. Alternates, both at the raw material and end product stage, were available and so were used. Even so its gain amounted to about 10% over 1954, an estimated 84,000 tons vs. 76,000.

GR-S latices saw their largest expansion in use and for very evident reasons. With prices relatively steady at from 22.5c for certain types up to 32.5c for others, economies under 50c per pound Hevea latex are obvious. GR-S latices were also capable of relatively fast production increases when demand increased. Consumption will probably be up about 35% over 1954, an estimated 60,000 tons vs. 44,000.

Neoprene latex also had a big usage year estimated as up more than 10% over 1954 in the U.S.A., an estimated 9,000 tons vs. near 8,000, priced at 37 to 47c. However, Neoprene latex, during 1946, was in still greater demand and over 13,000 tons were produced.

Acrylonitrile latices consumption increased by perhaps more than 85%, an estimated 8,500 tons vs. 4,500, priced at 46 to 54c. Exports of these synthetic latices from the U.S.A. also increased during 1955.

World consumption of all these rubber latices saw substantial increases during the year. Their sisters, plastic latices likewise developed larger markets, particularly in paints, paper and textile applications.

The present year of 1956 appears capable of absorbing still more latex. With GR-S latex production expanding, more can thus be made at moderate prices enabling more products to be established.

Hevea latex production capacity has by no means been on a maximum output basis during either 1954 or 1955 and so could provide additional quantities in the event its present price levels declined and usage increased. Thus latex continues in its rapid growth curve and the future appears still brighter.

*Arthur Nolan*

*Vice-President, Latex and Rubber, Inc., Baltimore, Md.*

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## *Sees Heightened Competition.....*

THOMAS D. CABOT

RUBBER compounding being the largest use for carbon black, and the consumption of rubber having reached an all-time high in 1955, it is natural that consumption of carbon black also made a new record. This has stimulated a large construction program. Annual capacity of plant additions completed in the past year are estimated at 63 million pounds in the U.S. and 33 million pounds in foreign countries. Plants not yet completed but already in progress will add further to capacity in 1956, probably over 110 million pounds for the U.S. and 150 million pounds abroad. If, as seems likely, production of automobiles declines in 1956, some decline in rubber and carbon black consumption is to be expected, and it is now apparent that the program of carbon black construction will result in considerable excess capacity and heightened competition. Already there has been some decline in the price of those grades which most of the new plants were designed especially to make.

These price reductions made in December applied to blacks made principally from oil. The prices of blacks made from gas have been strong. It has been clear for some time that gas blacks made by the channel process were being marketed at prices which do not reflect the cost of new gas contracts and new construction. Liquid hydrocarbons, which are now used increasingly as raw materials by the carbon black industry, have risen in price far less than gas, but as oil refining methods change it is to be expected that the supply of refinery products suitable for carbon black will decline.

The carbon black industry has made important strides during the past year in other elements of cost, especially in materials handling and transportation. Of particular interest are the new collapsible rubber containers suitable for the bulk transportation of carbon black which have been perfected to the point of commercial operation.

Despite savings in transportation cost, the trend in the carbon black industry has been to locate new plants nearer large markets. This is especially true abroad. Further expansion of overseas production will depend on political factors which are perhaps less encouraging than immediately after the Geneva Conference.

*Thomas D. Cabot*

*President, Godfrey L. Cabot, Inc., Boston, Mass.*

## *Scrap Prospects Not Bright.....*

SAMUEL TANNEY

THAT those of us engaged in the scrap rubber trade cannot look back over the year coming to a close with any feeling of gratification is perhaps a trite statement. Business generally has been booming, and the waste trades, so far as metals, rags, paper, etc., are concerned, have enjoyed some of it—in fact all waste materials, with the exception of scrap rubber which for the most part has been in the doldrums.

Except for Butyl tubes, the market has otherwise been featureless. During most of the year the main component of reclaimed rubber (scrap tires) has been moving at a price under 1c per pound. While, as some collectors have felt, the price is a depressed one, yet since the mills have been on a program of keeping inventory within defined bounds, and supplementary supplies can be had at this so-called depressed level, we must consider this to be the proper market-value, based upon the economic law of supply and demand.

Regardless of what the dealer may think of the price, since the scrap is actually moving in volume sufficient to take care of industry, it is neither wise nor indeed good business to expect the purchasing agent to pay more. To support this contention, we have but to look at the production of reclaimed rubber for the year thus far, and we find an increase generally of about 20%; and while inventories may be somewhat lower at the close of the year than they were at the beginning, still there were ample supplies to take care of this substantial production.

Coincident with this condition, we have had during the past couple of years freight rate increases of 50 to 60%, with the result that we have an ever-progressive narrowing of the radius which can be tapped as a source of scrap rubber, creating a situation causing many dealers to get rid of their collections either by consigning them to the dump, burning them, or in some instances actually paying the freight to the consuming mill.

Responsible men, both in industry and government, give us reasons to feel that the present high level of the economy will be maintained, certainly through the first half of '56, yet I am most reluctant to hold out the hope that it will materially affect our industry.

Reclaimed rubber is under pressure from stabilized GR-S and while there is a momentary tight position in GR-S, the supply will be considerably augmented as new production comes to the market so that unless the reclaimer can find additional and substantial other uses for his product, there would appear to be little prospect of the reclaimer taking on more scrap during the coming year than he has done thus far this year.

Doubtless the reclaimers are examining the possibilities of reducing costs, as well as seeking new outlets. The latter, we understand, has some prospects, but the possibility of reduction in the price of reclaimed rubber seems out of the bounds of reality. The obvious conclusion, therefore, is that those of us engaged in scrap rubber do not have very bright prospects for the coming year.

The scrap plastics industry was much more attractive during the first half of the year, and scrap moved in good volume at fair prices. But, with the advent of new and substantial virgin material coming on the market, we have experienced during the past few months a rather sharp decline in the price levels of both Vinyl and Polyethylene, which are the principal items accumulated by the dealer.

Since the production of new material is expected to increase progressively, we cannot feel encouraged that this scrap will enjoy the price position prevailing earlier in the year. However strong the wish may be, I cannot in all sincerity close on a more optimistic note.

*Samuel Tanney*

*Treasurer, Tanney-Costello, Inc., Akron, Ohio; also President, Scrap Rubber & Plastics Institute, N.A.W.M.D.*

## *Wire Industry Confident.....*

J. R. MACDONALD

ALTHOUGH it is only natural that upon the conclusion of the best peacetime year in the history of the electric wire and cable industry we should look forward with confidence to 1956, especially in view of the fact that the final quarter of 1955 was the period of heaviest demand during the year, I am of the opinion that there is a sound economic basis for our confidence. Basically, over a period, the production of the electric wire and cable industry is geared directly to the increase in generating capacity of the electric power companies, which is naturally dependent upon the projections by the power companies of future electric power consumption. For 1956, the privately owned electric power companies have already allotted a record $2.9 billion for electric equipment, including generators, boilers, cables, etc., compared to the expenditure of $2.8 billion in 1955. Commitments for generating and other equipment have already been made by utilities for delivery in 1958 and 1959 to take care of the anticipated further substantial increase in electrical consumption in the future.

The remarkable growth of the Bell and independent telephone companies (the Bell system added almost 50% more phones in 1955 than it did in 1954) while, it is anticipated, continue to grow at an even greater rate in 1956. This is borne out by the year-end statement of the President of the Bell system that "But we expect to do even more in 1956". We have received similar indications of 1956 plans from the executive heads of the principal independent telephone companies. For example, we understand that General Telephone Corporation, the largest of the independents, is budgeting an increase of approximately 15% in its capital expenditures for 1956.

Although present projections indicate some reduction in new housing in 1956 as compared with 1955, the rate of industrial construction in 1956, according to present forecasts, should more than make up for any slackening in home building.

Accordingly, we at General Cable Corporation are looking forward to 1956 as a year in which the demand for electrical wire and cable will substantially exceed the demand in 1955 and we are making our plans accordingly. The principal problem that the industry will face in 1956, and which may be a limiting factor, will be a shortage of copper. However, to an increasing extent, this shortage will be taken care of by the substitution for conductors of aluminum for copper.

*J. R. MacDonald*

*Chairman and President, General Cable Corp., New York, N. Y.*

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## *Challenging Period Ahead.....*

GILBERT K. TRIMBLE

THE demand for reclaimed rubber was at a steady, relatively high rate through the year 1955. Final figures are not yet available, but they should show a domestic consumption of some 318,000 tons plus an export demand of approximately an additional 12,000 tons. This is better than had been expected at the beginning of the year, and reflects the general high level of good business that has existed, particularly in the automobile and rubber industries. The 1955 consumption of reclaimed rubber has been exceeded in only one previous year. In 1951, during the hectic period of the Korean War, the rubber industry consumed 346,000 tons of reclaimed rubber.

The industry situation is not an extremely optimistic one, however, since the consumption of new rubber has increased

to a much greater extent than the use of reclaimed rubber, and in 1955 broke all records for consumption. The ratio of use of reclaimed rubber to new rubber has followed a downward trend for the last 15 years. The high tonnage level of consumption, therefore, reflects the growth of the entire rubber industry rather than an increase, percentagewise, in the use of reclaimed rubber.

The present prices for natural rubber, and newly increased prices for many of the grades of synthetic, should make the reclaimed product of considerable economic importance. The industry production capacity now stands at approximately 420 long tons, which leaves a sizable margin of potential supply available to the rubber manufacturing industry.

Sale of the government owned plants to private industry was regarded favorably in the reclaiming industry. Reclaimers have always believed in the free enterprise system, and welcome competition from the synthetic plants on a private industry basis.

The expanding facilities for the production of synthetic, and the higher prices of natural rubber, are resulting in a much greater ratio of use of the synthetic product. This, along with the announcements of the many new polymers, indicates that the rubber reclaiming industry is faced in the future with major changes in its raw material, and possibly in its finished products. It will be a challenge to the managements and technical staffs of the reclaiming companies of America to work with the changing conditions to produce better materials at competitive prices.

There are rather definite indications that automobile sales in 1956 will not reach the 1955 level. If this is borne out, we shall probably see a lower consumption of reclaimed rubber during the year. A good replacement tire production year, as has been predicted, would help to take up some of the demand, however. Also, if shortages of new rubber develop, the rubber industry will turn, as it always does under these circumstances, to a greater use of the old stand-by—reclaimed rubber.

There are many presently unpredictable factors which could affect the reclaiming industry during the year favorably or unfavorably. We shall, however, probably see something between 300,000 and 320,000 long tons of reclaimed rubber used in the United States in 1956.

*Gilbert K. Trimble*

*President, Midwest Rubber Reclaiming Co., East St. Louis, Ill., also, President, Rubber Reclaimers Association, Inc.*

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## *Plastic Production Increasing.....*

GEORGE C. MILLER

MORE plastics were produced before the end of the first ten months of 1955 than in any other previous full year. It seems likely that the rate of production and sales established by the plastics industry in 1955 will continue through the coming year. Before the end of October industry production of plastics surpassed the record output for a full year, set in 1953. Estimated production for October also set a new record for a single month's output by the plastics industry. At least seven months of the year exceeded a monthly rate of 300,000,000 pounds of plastics produced. This is particularly significant because production by the plastics industry had never before reached 300,000,000 pounds in any single month prior to 1955.

Production of plastics in the United States should reach an estimated 3,500,000,000 pounds by the end of 1955, based on figures for the first eight months and estimates for the last four. Plastics sales are expected to reach 3,300,000,000 pounds by the end of 1955. Major groups of plastics registered impressive gains as the entire industry moved forward. Estimates in round figures for total sales during 1955 show that all vinyl plastics posted a new high at about 600,000,000 pounds, nearly 16.5 per cent higher than the 1954 sales figure. Sales of phenolic plastics are estimated at about 450,000,000 pounds, almost 15 per cent above 1954 figures. An estimated 545,000,000 pounds of styrene plastics sold in 1955 marked an increase of more than 18 per cent over 1954.

Polyethylene, which has been the rapidly rising star of the plastics industry for each of the last 10 years, is expected to finish the year with sales of from 350,000,000 to 400,000,000 pounds, a gain of approximately 40 to 50 per cent over 1954. It is estimated that the industry capacity by the end of 1956 will reach or exceed 600,000,000 pounds.

While there were a large number of new applications in 1955, these new uses were overshadowed tonnage-wise by a broadening of the uses of plastics developed during prior years. These expanded applications would include: Hard-surfaced floor covering of vinyl, laminations of vinyl film and sheeting with textiles, plastics components in both small and major electrical appliances, a wide variety of packaging applications, etc.

New uses for plastics as such, as well as, plastics combined with older materials such as metal, glass fibers, wood, cloth and paper indicate continued healthy growth of the plastics industry, which is already growing five times faster than the average of all industry.

*George C. Miller*

*President, Bakelite Co., New York, N. Y.*

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## *All Factors Favorable.....*

F. L. DAWES

A CONSIDERABLE portion of our backlog at the close of 1955 was the result of previous years' engineering developments. These improvements and new developments have broadened the scope of our activities, not only in our own field, plastics and rubber, but have given us entree into new industries, both domestic and foreign. Of particular importance are improvements in rubber and plastics calenders and the introduction of unusual press designs used in the manufacture of decorative laminates and hardboard. Our chip-core machine has been widely accepted in the furniture industry and a number of these machines are now under construction. In keeping pace with modern aircraft development, we are designing and have under construction new types of tire and brake testing equipment. This dynamometer-type of testing apparatus replaces the outmoded designs of ten years ago and is required by most of the major rubber companies, our own Air Force, and those of other countries.

One of the most significant developments of 1955 was the launching of a tremendous expansion program in the production of synthetic rubber, and this is bound to be reflected in demands for new rubber machinery. We are making our plans accordingly.

We started the year 1956 with one of the largest backlogs of unfinished business in the history of our company and, as a result, have an unusually heavy engineering load. However, the wide acceptance and continued demand for new Adamson products makes it essential that we continue with our engineering development work. Many new problems have been attacked and substantial progress is being made toward their solution.

All the factors which should make 1956 a banner year are with us. Our principal business, rubber and plastics machinery, is closely related to automobile production, and automobiles and the steel to make them lead a record 1955 expansion parade. Thus, despite the fact that 1956 is an election year and that, traditionally, this brings some doubts in business quarters, we believe that expansion and growth will continue and that the new year brings great promise of unequaled peace-time prosperity.

*F. L. Dawes*

*President, Adamson United Co., Akron, Ohio.*

## *Textile Prospects Favorable.....*

T. SCOTT AVARY

SINCE industrial textile business activity naturally depends directly upon the productivity of the major textile-consuming industries, it is encouraging to find that leaders in the rubber industry today are optimistic about the prospects for continuing good business in the coming year. Production planned for the first six months is reported to be at approximately the same rate as in 1955.

Prospects for tire fabrics are affected by a number of factors. With motor travel constantly on the increase, some manufacturers are expanding their facilities for production of truck and passenger car tires. They believe that, even if the automobile industry should only produce 6,000,000 cars in 1956 instead of the 8,000,000 originally predicted, the replacement business for tires would offset the decrease in original equipment. Also there has been mention of the automobile manufacturers changing to 14" passenger car tubeless tires for 1957 instead of the 15" tires now being used; and, if this is true, production of the new size tire will start during 1956. Since it would be necessary to carry larger inventories of the two sizes for quite some time to come, this would mean increased consumption of tire fabrics.

Apart from tires, in other segments of the rubber industry, such as mechanical goods, activity in fabrics has been brisk in 1955. In general, present thinking indicates that this trend will become even more pronounced in 1956. A principal basis for this thinking is the extensive development work now taking place on conveyor belts for many new and promising applications, on "moving sidewalks" with a wide array of potential uses, and on other stimulating ideas conceived within the rubber industry. At the same time the textile industry is working on a great many new fabric development ideas which are already evincing considerable interest for rubber applications.

At the present time the textile industry generally, including that segment that serves the rubber manufacturing field, is in a healthier position than it has had for some years. And looking even farther, American industry generally is embarked on large-scale expansion plans, and all signs presage a period of increased industrial productivity and broadening markets, continued employment and high purchasing power—all of which point to favorable prospects for both the rubber and textile industries.

*T. Scott Avary*

*President, Wellington Sears Co., New York, N. Y.*

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## *Natural Rubber Looks Forward.....*

H. C. BUGBEE

IF one had to condense the feeling for the future of the natural rubber industry into a single word, that word might well be "confidence." This is not based on heady optimism, blind to the competition of synthetic, but rather on the facts as leaders in the natural rubber industry see them. While final figures for 1955 are not yet tabulated, it looks as though U. S. consumers used a record 1,525,000 tons of rubber. Of this, some 630,000 tons, or 40%, were natural. When the final count is in, these figures may vary a bit, give or take, but they are close enough to make the point. And that is that despite a natural price that has gone as high as 50c and has consistently stayed well above 30c to synthetic's 23c, natural has maintained a sound share of the over-all rubber market.

Actually, though, the natural rubber industry's optimism is not based on these '55 figures, because the industry is well aware that the '55 price is not the long-term norm. The '55 price was based on continuing and unexpectedly high consumer demand, in conjunction with a shortage in the competing synthetic commodity. This is a combination of circumstances that will always force prices high in a free market. We don't know what the prices will be in '56. Rubber is in a free market, and if the demand continues, it is likely that natural will for some time continue to command a premium over synthetic. When we think in terms of natural's future, however, we don't use '55 or even '56 as our gauge. We're looking to a future when natural will be competing for a normal-demand market with a synthetic in full supply. And we look to that future with confidence.

In every past decade rubber usage has doubled. It is not expected that 1960 will double 1950's worldwide consumption of 2,280,000 tons. But it has been estimated by the Rubber Manufacturers Association that by 1960 consumption will reach 3,500,000 tons. The natural industry believes that it will get its full share of this expanding rubber market. With a steady increase in over-all rubber usage sparked by growing automobile production and multiplying non-tire uses of rubber, the statistical expectation seems to point to sufficient consumption demand to healthily take care of all the natural and synthetic that can be produced at a logically competitive price.

The natural rubber industry is fully cognizant of its new competition and has already taken steps to meet it. We believe that the next decade will continue a dynamic economy, and that in that economy there will be rising demand for rubber that will need full production of both synthetic and natural. We believe, too, that the competition between natural and synthetic will react to the benefit of the buying public. It will result in more and better rubber products at lower cost; and when the price, production and quality chips are down, natural will hold its competitive own in a future we face with every confidence.

*H. C. Bugbee*

*President, Natural Rubber Bureau, Washington, D. C.*

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## *Upward Pattern Noted.....*

WARREN E. HILL

THE American economy in the past year spiraled upward at a rate never before achieved. New all-time high records were established for national production and income. The growth in personal spending power created a booming economy. One of the chief beneficiaries was the automotive industry. More new cars were produced and sold in 1955 than ever before in the history of the industry. As the number of automobiles increased, so the sales of supplier products rose. Oil, gasoline, tires and automotive replacement parts, such as fan belts and brake linings, enjoyed a gratifyingly good sales year.

Thermoid Company, a leader in the production of rubber and asbestos products for the automotive and allied industries, recorded a sales rise of more than 18% while net earnings jumped about 46% in 1955. Sales came to aproximately $39,500,000 while net earnings were in the neighborhood of $1,400,000, or $1.60 per common share.

The year ahead seems promising for Thermoid and the automotive parts industry. In the past few years, the pattern of income and spending has been upward. The number of vehicles now in use in the United States is at the all time record high and increasing without let-up. The need for belts, brake linings, carpets, and other products made by Thermoid should continue at a high level. The long range outlook for Thermoid appears to be excellent. If Congress passes a highway program as expected, automobile use should expand further. As a leading producer of replacement parts, Thermoid should profit proportionately.

*Warren E. Hill*

*President, Thermoid Co., Trenton, N. J.*

# NEWS REPORTS and Industry Activities

## GOODRICH-GULF SIGNS CONTRACT FOR INSTITUTE; FINAL SALE HINGES ON CONGRESSIONAL ACTION

THE Rubber Producing Facilities Disposal Commission, on December 20, announced that it had signed a contract with Goodrich-Gulf Chemicals, Inc., of Cleveland, Ohio, for the sale of the government-owned synthetic rubber plant at Institute, West Va. The sale price of $11,000,000 represented the highest amount offered for the plant during negotiations. The Institute plant is the largest of all the government-built rubber plants, with an assigned annual capacity of 122,000 long tons of synthetic rubber. It is the twenty-sixth of twenty-seven plants owned by the government to be sold. The other plant, an alcohol-butadiene facility at Louisville, Ky., has been leased for a three year period to Publicker Industries, Inc., Philadelphia, Penna.

Negotiations for the sale of the Institute plant were authorized by Public Law 336 (84th Congress, 1st Session). This legislation was enacted after the Disposal Commission reported to Congress last January that no bids were received for the plant in the original disposal program, and it faced a statutory three-year period in standby. The Institute plant has not been operated since September, 1953.

According to the Disposal Law, the contract is subject to review by the Attorney General, and his decision in the matter was to have been rendered by midnight, January 5. At this writing, however, it seems likely that Congress will be asked to decide whether sale of the plant to Goodrich-Gulf would hamper competition in the synthetic rubber industry, without a Justice Department decision.

The Anti-Trust Division of the Justice Department had already delayed its decision because of the difficulty in making a clear-cut ruling. The Disposal Commission negotiated with six bidders for two months before signing the contract with Goodrich-Gulf. At the time the bids were received last fall, Assistant Attorney General Stanley N. Barnes advised against selling to Goodrich-Gulf or to the Goodyear Synthetic Rubber Corp. Sale to either of these firms, he stated, would create anti-trust problems.

### *Barnes Makes Recommendation*

Mr. Barnes suggested that the Disposal Commission confine its dealings to one of the four "independents" that had bid for the plant. Other than Goodrich-Gulf and Goodyear Synthetic, Union Carbide and Carbon Corp., United Rubber and Chemical Co., Imperial Commodities Corp., and California industrialist Edwin W. Pauley had bid for the facility.

As it developed, however, none of the "independents" approached the $11,000,000 bid offered by Goodrich-Gulf. It was reported that none had met the Disposal Commission's minimum price tag of $9,500,000. Justice Department officials are believed to be anxious to avoid any action that might jeopardize sale of the plant.

Therefore, the Justice Department, in seeking a way out of the dilemma, was reported to be seriously considering making no anti-trust finding at all. Trade sources stated that the Department, in reporting to Congress, would simply list all the factors in the sale which have bearing on the competitive structure of the synthetic rubber industry.

It would then be up to the Disposal Commission whether to seek Congressional approval of the sale or withdraw from its deal with Goodrich-Gulf. If the Disposal Commission decides to go ahead, then Congress, which has thirty days to review the sale, will have to decide if the unevaluated data it gets from the Justice Department adds up for or against the sale.

The $11,000,000 price tag itself is expected to draw little argument from Congress. That price is nearly double the present book value of the Institute plant and—at $90 per ton capacity—falls within the $53 to $163 per ton range of previous sales. The Institute plant originally cost $18,000,000 to build in 1942.

The Disposal Commission has data showing that each of Goodrich-Gulf's competitors is expanding in synthetic rubber. The 733,600 long tons now in private hands will be increased to 1,056,000 long tons when planned expansions are completed. Only Goodrich-Gulf, with a 90,000 long ton facility at Port Neches, Texas, is not expanding. Purchase of Institute could then be reckoned as Goodrich-Gulf's "expansion."

With its 90,000 long ton facility at Port Neches, Goodrich-Gulf controls 12.3% of the synthetic rubber producing capacity. Congress has already approved an 18.6% share for the Firestone Tire & Rubber Co. If Goodrich-Gulf secures the Institute plant, it will control just about 20% of the producing capacity.

On the other hand, officials are examining the enlarged share of capacity that will be in the hands of the "Big Four." The four largest firms, which include Goodrich-Gulf (half-owned by the B. F. Goodrich Co.), presently control 60% of the nation's synthetic rubber capacity. If the Institute sale contract is approved, these companies will control about 70% of the capacity.

Barring an upset, the plant will be transferred to Goodrich-Gulf in mid-February. Goodrich-Gulf hopes to have one 40,000 ton unit in production 90 days later, or mid-May. The plant has three separate production units, each of about 40,000 long ton capacity.

### *Availability of Butadiene*

Availability of butadiene and the market demand for synthetic rubber will determine how rapidly the two remaining units are reactivated. Company officials have stated that eventually the plant will be restored to full production.

Goodrich-Gulf has agreed to make a sizable portion of its output available to small consumers, including more than half of the first 40,000 long tons. Institute will operate largely on petroleum-butadiene produced by the company at Port Neches, Texas.

Other plans call for the installation of refrigeration and continuous processing equipment for "cold rubber," and the addition of boiler and water plants. Employment will be increased ten-fold from the present maintenance force of 30. The New York Central Railroad and Kanawha-Ohio River barges are available to move the plant's output to eastern and midwestern markets.

While industry interest centered about the Institute plant, the General Tire & Rubber Co. of Akron, Ohio, announced that the nation's first postwar, privately-financed and completely integrated synthetic rubber operation will be built near Odessa, Texas. The project comes as the result of an agreement between General Tire and the El Paso Natural Gas Co., one of the nation's major natural gas pipeline companies.

The long term agreement covers the production and sale of styrene and butadiene to supply the new GR-S type plant. Construction of the new facilities is scheduled to begin immediately. Production of synthetic rubber is expected to start about July 1, 1957, from the integrated operation, under terms of the agreement. The copolymer plant will have a capacity of 40,000 long tons a year.

Odessa's location in the highest oil-producing county in Texas makes it a natural and economical site for the operation. William O'Neil, president of General Tire, in commenting on the agreement, said: "This agreement climaxes our years of research and development in synthetic rubbers that are adaptable to modern, streamlined equipment and processes. The plants built during the war emergency by the government are now nearly 15 years old and their equipment does not lend itself readily to such improvements as we have developed in processing synthetic rubbers."

General Tire operated the government-owned GR-S plant at Baytown, Texas, from 1943 until April, 1955, and is engaged in the production of synthetic rubber latex and rubber chemicals at its Mogadore, Ohio, plant.

### *NSF Research Unit Reports*

The special eleven-member advisory commission appointed by the National Science Foundation to develop recommendations on the future role of the federal government in basic research on synthetic rubber recommended, on December 19, that the government end its contracts supporting synthetic rubber research at the University of Akron next June. The recommendation, if accepted, would give the University the choice of leasing the laboratories without federal subsidy or selling them to a private company. The eleven-man group offered its views for the guidance of the Bureau of the Budget, the White House and Congress.

If Akron University decides to lease the laboratories, it would be obliged to maintain them. However, there would be no government controls on how the laboratories are to be used. The proposal amounts to a year of grace in which the University could discover to its own satisfaction whether the laboratories will pay their way under unsubsidized University management.

The commission also recommended ending the $1,000,000 federal rubber research program and replacing it with "a new and more basic program" of generalized research. Akron University now has a $50,000 share of this separate program. In addition, the University receives a $50,000 fee for operating the laboratories. The total budget for the laboratory is $950,000.

Adoption of the Commission's recommendations would cut $100,000 from the University's annual income, unless the school can find customers for the laboratories' services on a profit-making scale. The University recently signed three research contracts with private companies on an annual basis totaling approximately $300,000.

In preparing its report, the Commission is said to have learned that the Department of Defense would not underwrite the laboratories and defense officials were of the opinion that they could get along without them. The National Bureau of Standards would have liked to take over the laboratories, but the Commission found that such a transfer was not essential. The Commission is also of the opinion that Agriculture Department rubber research would not be jeopardized if the laboratories were not available. It was also reported that rubber, chemical and oil companies have indicated interest in buying or leasing the laboratories or contracting for their services.

### *No Longer Producing Synthetic*

As the government no longer produces synthetic rubber, federal operation of the laboratories "is no longer appropriate," the Commission report stated. "The Commission is firmly of the opinion that no justification exists for continued expenditure of taxpayers' funds to maintain and operate the laboratories."

The Commission stated however that "the University of Akron has rendered a public service in managing and operating the laboratories for the government." It noted that the University wants the laboratories, is experienced in operating them, and "undoubtedly" would make them fully available to government and industry.

Turning to broad rubber research policy, the Commission took note of the recent development of the natural-like synthetic rubbers. Industrial production of this type of rubber will take considerable time, it said, recommending that "the government, at its highest levels, give immediate consideration to the following question: Does the national security require government action to foster the industrial development of the new processes of synthesizing 'natural rubber'?"

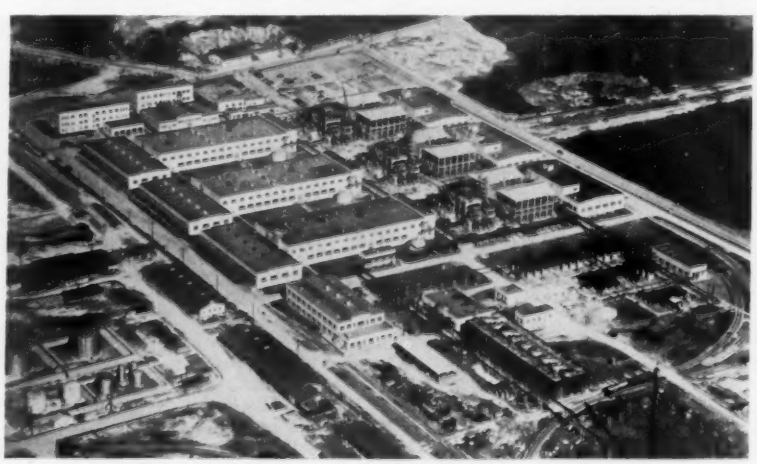
An answer to this question can only come after complete study by the Department of Defense and the Office of Defense Mobilization. The final decision will probably rest with the National Security Council.

### FTC Challenges Merger

The Federal Trade Commission, Washington, D. C., has charged A. G. Spalding & Bros., Inc., of Chicopee, Mass., with violating the anti-merger law by acquiring the Rawlings Manufacturing Co. of St. Louis, Mo., on December 6. The FTC said the companies are two of four leading manufacturers and distributors of athletic goods in the United States. The government agency stated that the elimination of Rawlings from the competitive picture may create a monopoly. The parties were given thirty days in which to file an answer to the complaint. A hearing has been scheduled for February 28 in New York City. Meanwhile, directors of A. G. Spalding have elected Claude E. Carr a vice-president and director. Mr. Carr is president of the Rawlings company.

### Paeco to Remain in Ravenna

Paeco Rubber Co. of Ravenna, Ohio, will remain in that locality as a result of an agreement reached between company officials and civic authorities. The company has announced plans to build a new plant in Ravenna at a cost of $200,000. Residents of the area in which the plant is to be built had previously protested as to the plant's location. A compromise agreement was reached in which the company agreed to set back its new facility, plant new trees and landscape the area. Company officials now state that they hope to break ground for the new plant in early spring, depending on steel supplies.



*Shown above is an aerial view of the Institute, West Va., synthetic rubber plant. The plant has been in standby since autumn of 1953, and is said to be the largest single facility in the world for the production of synthetic rubber.*

## REPORT NEAR ON FTC PROBE INTO TIRE SALE PRACTICES

According to reports from Washington, the Federal Trade Commission will, in January, receive for decision a report on its investigation into rubber and oil company cooperative sales practices. The investigation was one of the most extensive in FTC history and took six years to complete. Under study were three of the "Big Four" rubber companies and many oil companies. While FTC has not revealed which three of the "Big Four" were the subject of the investigation, the companies themselves were aware of the probe. Under FTC practice, the Commission will receive a staff report together with a recommendation to issue a complaint against the companies involved or to drop the case.

If a complaint is issued, an FTC hearing examiner will listen to the charges and to the defense. His decision will be reviewed and final action taken by the Commission itself. The current investigation centers on "over-riding commissions" paid to the oil companies by the tire companies in return for promoting tire, battery and accessory lines in oil company stations.

FTC Chairman John W. Gwynne described the TBA study as "an extremely complicated matter requiring a great deal of thought." He said there are important legal questions to be considered as well as factual questions regarding alleged coercion of gasoline station operators. Mr. Gwynne emphasized that he had not seen the staff report and was speaking on the basis of public information put before Congressional committees.

### *Question of Law Raised*

As one informed observer summed it up: "The $64,000 question is whether the over-riding commission arrangements violate any law." Over-riding commissions run into millions of dollars annually. The tire companies pay them directly to the oil companies, usually 5 to 10% on sales by station operators.

Joseph E. Sheehy, director of the FTC Bureau of Litigation, described the arrangement in testimony before a House Small Business Subcommittee headed by Representative James Roosevelt (Dem., Calif.). Mr. Sheehy stated that one big oil company received "almost $5,000,000" commission from two rubber companies in an 18-month period on gasoline station sales of more than $56,000,000.

This was an oil company with gross annual income of $1,500,000,000, net income of $180,000,000. The oil firm estimated that one-third of the over-riding commissions was profit. In return for the commission, the oil firm is said to have helped the rubber companies in lining up its leased stations as customers and in promoting the rubber companies' TBA lines.

Mr. Sheehy also reported that the station operators' leases run for one year and usually can be cancelled without prior notice under some circumstances. FTC investigators talked to every station operator for the various oil companies in spot-checked cities such as Philadelphia.

Mr. Sheehy declared that some operators "stated that they had a fear or feeling that their leases would be cancelled if the sponsored TBA products were not exclusively handled." Others said they got this impression from "representatives of the oil companies", Mr. Sheehy testified. Still others had no worries of this kind.

The Roosevelt subcommittee in its report recommended longer leases as protection from "pressure forcing exclusive handling of certain tire and accessory lines." The subcommittee heard station operators testify of leases revoked because of refusal to buy sponsored TBA lines.

The subcommittee cited the case of a Sinclair dealer who lost his lease for declining to purchase Goodyear products. In a reverse case, a Sun Oil lessee said he was threatened with loss of his lease for selling Goodyear products because Sun Oil did not sponsor them.

In noting the legal problems before FTC, Mr. Sheehy said: "It would be a useless gesture to recommend to the Commission the issuance of a complaint if under the statute they have a complete defense in the way of cost justification."

Mr. Sheehy predicted last April that the Commission would get the staff report "in six months". The six months are long past, and the staff now is expected to turn over more than ten filing drawers of TBA information shortly.

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**Want to make your opinion known? Write a letter to the editor! (See page 490).**

## WITCO CHEMICAL ANNOUNCES ELECTION OF NEW EXECUTIVE OFFICERS

Max Minnig

Robert Wishnick

William Wishnick

Max A. Minnig was elected president of the Witco Chemical Co., New York, N.Y., to succeed Robert I. Wishnick, who was advanced to chairman of the board and chief executive officer at the annual meeting of the board of directors held on December 10. William Wishnick was named to succeed Mr. Minnig as executive vice-president. Mr. Minnig joined Witco in 1946 as head of the Natural Gas Division. He then transferred to the Sales Department and was elected vice-president in 1950 directing the sale of carbon black and rubber chemicals with headquarters in Akron. Subsequently appointed director of sales, he came to the executive offices in New York and became executive vice-president in 1953. A graduate of the University of Oklahoma in 1940, Mr. Minnig served as a colonel in the Air Corps during World War II and joined Witco shortly thereafter.

William Wishnick, the newly-elected vice-president, became affiliated with the company in 1942. He served in the Air Corps during World War II and afterwards was active in Witco plants in Chicago, Ill., and Perth Amboy, N. J. After a period in the Sales Department, Mr. Wishnick joined the executive offices in New York and in 1951 was named treasurer of the company. He was named vice-president in 1953. He is a graduate of the University of Texas. Robert I. Wishnick had been the company's only president since its formation 35 years ago. According to Mr. Robert Wishnick, the new management will provide "young, aggressive, hard-hitting leadership to direct the company's future growth and expansion".

### New Plastics Sales Offices

Phillips Chemical Co. has announced plans to establish a new district office of its Plastics Sales Division at Akron, Ohio. W. M. Larsen has been promoted to manager of the new office. The staff of the New York plastics sales office is being enlarged with appointment of M. B. Bistline as sales engineer under W. C. Douce, district manager. The new Akron district office, to be established next spring, is the fifth such office announced in recent weeks as the company prepares to meet the huge demand already indicated by widespread acceptance of its new family of olefin polymers, trademarked "Marlex". Commercial production of Marlex thermoplastic is scheduled to begin in mid-1956 at the company's Adams Terminal plant site on the Houston Ship Channel near Pasadena, Texas.

A sales service laboratory under construction at the Phillips Research Center in Bartlesville, Okla., will provide complete facilities for adapting Marlex to customers' needs. Until the new district offices are established, their staffs will operate from Bartlesville, establishing contacts with representatives of plastics products fabricators in their areas. George Wash is director and sales manager of the Plastics Sales Division. Before their new promotions, Mr. Larsen was marketing assistant in the parent company's sales department and Mr. Bistline was a development engineer in Phillips' research and development department.

# SPI COATED FABRICS DIVISION HOLDS SIXTH CONFERENCE IN NEW YORK

The Film, Sheeting and Coated Fabrics Division of the Society of the Plastics Industry, Inc., held its Sixth Conference on December 6 and 7, 1955, at the Hotel Commodore in New York City. The meeting included the presentation of a number of interesting papers, special luncheon speakers, and the showing of a new color movie on vinyl film products.

Fred Strauss (Harte & Co.) served as chairman for the conference. He was assisted by David Carnegie (Consultant), Willard Crater (Naugatuck), Edward Dunlavy (Goodyear), Charles Edelmann (Firestone Plastics), J. P. Frank (Presto Plastic Products), Theodore S. Lawton (Monsanto), Robert Mathews (Archer-Daniels-Midland), Bernard Mittman (Elm Coated Fabrics), Robert Monica (Dow Chemical), Paul Murphy (Goodrich), Everett Perlberg (Adamson United), J. R. Price (Bakelite), and Stanley Somerville (General Tire).

In his paper on "Automation in Handling and Proportioning Bulk Materials", I. H. Richardson, president of the Richardson Scale Co., Clifton, N. J., stated that the mechanical handling and automatic weighing of bulk materials are operations which are already well developed for the laborless process. Such equipment readily lends itself to the further application of instrumentation for remote control, recording, indicating and feedback adjustment by any of the monitoring systems in use today or proposed for the foreseeable future.

Already a wealth of experience in automatic measurement of materials has been acquired by the more progressive members of the process industries, he stated. This experience is available to the plastics industry whenever greater productivity and improved quality control are required.

### *Discusses Plasticizer Absorption*

Marion R. Rector of the Dow Chemical Co., Midland, Mich., for his part in the conference contributed a "Discussion of Fish-Eyes and Plasticizer Absorption". The speaker explained that in the fabrication of articles from polyvinyl chloride, surface irregularities are encountered which are frequently termed fish-eyes or gels. Although they may present some fabrication difficulties, their main objection is esthetic and leads to ultimate consumer disapproval.

Mr. Rector discussed the manner in which fish-eyes are formed and what can be done to eradicate this problem. He stated that a fish-eye free finished product requires understanding and care from the monomer to the finished product.

"Laminates of Vinyls to Rigid Materials" was the title of the paper delivered at the conference by Willard de Camp Crater of the Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn. Mr. Crater explained that the concept of lamination was conceived so that chemical resistance and structural strength could be embodied in sheet stock for further fabrication into finished products.

The speaker discussed the various methods by which laminates are produced and stated that it is now felt that laminates will have their greatest growth in fields where the product is both functional and decorative. New high styles, in a wide range of colors and finishes with outstanding permanence, are now possible.

George L. Booth of the Dilts Division, Black-Clawson Co., Fulton, N. Y., spoke on "Converting Machinery for processing of Plastic Materials in Web Fed Operations" at the conference. Mr. Booth confined his remarks to innovations in the coating of fabrics and a reiteration of some of the more common methods that are in use today.

### *Outlines Coating Methods*

Mr. Booth discussed four types of coating methods that can be used for fabric, including knife coating, reverse roll coating, extrusion and calendering. Following this portion of his address, the speaker offered a key which should aid in the selection of a method of coating when the end product is known and a given coating formulation is to be processed.

Ephraim Freedman of R. H. Macy & Co., New York, N. Y., chose as the topic of his address before the conference, "Improvement in Vinyl Film Products." The speaker stressed the necessity for adherence to good quality standards. He urged that greater use be made of informative labeling as well as consumer and retailer education.

"Gauge Control in Calendering" is the title of the paper delivered at the conference by Michael Jukich of the Goodyear Aircraft Corp., Akron, Ohio. The speaker discussed the problems his company had encountered in developing a method of getting good transverse gauge or profile.

This led to the development of a new calender complete with cross axis, a hot water circulating temperature control, beta ray gauges, and a new device called a roll bending unit which controls variation n roll deflecton by external means. The speaker exhibited slides showing results obtained to date through the use of the new calender.

Gabriel F. Goldstein of the Interchemical Corp., Newark, N. J., in his paper on "Valley Printing", explained that this is a process which consists of embossing vinyl film, sheeting, or coated fabric, and simultaneously coloring the areas which have been embossed. The basic principle in valley printing is the furnishing of ink to the hills or peaks of the design on the embossing roll just before it comes in contact with the fabric. The color is thus deposited into the valley of the material as it is being embossed.

### *Ink Handling Problems*

Mr. Goldstein discussed the principles and the handling of valley inks. For a better understanding of the problems involved, he also delved briefly into the equipment and engraving aspects of this process. Valley printing, stated the speaker, has captured the imagination of the public and increasing quantities are going into various uses.

"Present Day Techniques in Heat Sealing" is the title of the paper delivered at the conference by Ivan H. Schwartz of the Radio Receptor Co., Inc., New York, N. Y. Mr. Schwartz emphasized that heat sealing, insofar as the fabricator of vinyl is concerned, is electronic welding and nothing else.

The speaker discussed the welding of vinyl plastics by radio frequency and traced the development of electronic welding. He outlined the manner in which electronic welding equipment operates and cited those factors which make for weld quality.

Reuben Wisotzky of L. E. Carpenter & Co., Wharton, N. J., for his part in the conference, spoke on "Vinyl Foam and Its Applications". The speaker briefly reviewed current development attitudes and activities. He reviewed some of the characteristics of vinyl foam in terms of the structural contribution vinyl foam can make.

He also attempted to highlight the significance of vinyl foam in terms of its effect on product design and product application. The speaker also made reference to some of the application techniques presently available.

### *Non-Structural Applications*

"Non-Structural Application of Vinyl Film and Sheeting" is the title of the paper presented at the conference by Eli A. Haddad of the Plastics Division, Monsanto Chemical Co., Springfield, Mass. His discussion centered about recent trends and successes of vinyls in general construction. To this end, he outlined the use of vinyl vapor barriers, vinyl faced thermal insulation, rigid vinyl light diffusion panels, etc.

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### Panarez Hydrocarbon Resins

Pan American Chemicals Corp., New York, N. Y., has introduced two new hydrocarbon resins, "Panarez 3-290" and "6-290." These new resins are of special interest because of their high softening points, approximately 280-300°F. Light in color, they are said to have an excellent odor. Completely hydrocarbon, they are neutral an non-saponifiable. The company states that the resins show good resistance to water, alkali and alcohol and in addition, have excellent dielectric characteristics. The new materials find use in rubber compounding as softeners and extenders where a high softening point hydrocarbon resin is desirable.

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### Koppers Sets Expansion Program

Koppers Co., Inc., Pittsburgh 19, Penna., will invest approximately $25,000,000 in 1956 to continue a five-year expansion program launched in 1955. Investments during the year will be made through acquisition, in the expansion and improvement of existing facilities, and in the construction of new plants. Approximately $25,000,000 was invested by Koppers in 1955 in acquiring six different companies, in expanding and improving existing plants and for the addition of new plant facilities.

## DIVISION INVITES PROPOSALS FOR GOODYEAR MEDAL NOMINEES

John M. Ball (Midwest Rubber Reclaiming) past chairman and a director of the Division of Rubber Chemistry, A.C.S., has announced that members of the division are now being invited to propose names to the Charles Goodyear Medal Committee for the purpose of electing a Medalist for 1956 at the Spring Meeting to be held in Cleveland, Ohio, on May 16-18. Any member of the division who wishes to propose a name should obtain from the Secretary, A. M. Neal, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del., an outline suggesting the form in which such a proposal should be made.

The proposal, in proper form, should then be mailed to reach the Secretary no later than March 26, 1956. In this way, the Secretary will handle the proposals and distribute them to the members of the Executive Committee in advance of the Cleveland meeting.

It will be recalled that the Goodyear Medal was established in 1939 to commemorate the 100th anniversary of the invention of vulcanization, and first awarded in 1941. The division by-laws, Section XIV, Item No. 1, reads:

"The Charles Goodyear Medal, in commemoration of the discoverer of the vulcanization of rubber, may be awarded annually to a person who has made a valuable contribution to the science or technology of rubber or related subjects."

It should be noted that the by-laws do not exclude the election of a foreign chemist, and division members may propose such a person for the 1956 award.

In order to assist division members in proposing suitable names for the Goodyear Medal, Mr. Ball has made available a listing of past Medalists and the titles of their lectures:

*1941*—David Spence (no lecture given).
*1942*—L. B. Sebrell, "The Second Mile".
*1943*—No medal awarded.
*1944*—W. L. Semon, "Research Leading to Commercial Butadiene Synthetic Rubber". (Because of the war, Dr. Semon did not deliver his lecture until 1946).
*1945*—No medal awarded.
*1946*—Ira Williams, "Vulcanization of Rubber with Sulfur".
*1947*—No medal awarded.
*1948*—George Oenslager (no lecture given).
*1949*—Harry L. Fisher, "Rubber Research and the Need for a Rubber Research Institute in the United States".
*1950*—C. C. Davis, "Some of the Real Pioneers of the Rubber Industry".
*1951*—W. C. Geer, "Strategy in Rubber Research".
*1952*—H. E. Simmons, "Out of the Past".
*1953*—J. T. Blake, "The Future of Rubber".
*1954*—G. S. Whitby, "Reflections on Rubber Research".
*1955*—R. P. Dinsmore, "Specifications for a Rubber Chemist".

In order to further assist division members, Mr. Ball has also made available a list of certain fields of rubber chemistry and technology which have not yet been fully recognized by the election of Medalists. The existence of this list, however, does not imply that additional awards are prohibited in fields already recognized; for example, vulcanization and polymerization. The list follows:

Invention and development of polychloroprene; vulcanizable copolymers of isobutene and dienes; reinforcement; physics of rubber; polysulfide rubbers; silicone rubbers; cold and oil-extended GR-S rubbers; polyacrylate rubbers; new reinforcing fillers; delayed action accelerators; physical testing; new processing equipment; tubeless tires; automation; antioxidants; oxidation vs. mastication; reclaiming (devulcanization); synthetic natural rubbers, and isocyanate rubbers.

## C. P. HALL CO. OF ILLINOIS ADDS THREE NEW SALES REPRESENTATIVES

Roger Knapp

Harry Weist

Lenoir Black

C. P. Hall Co. of Illinois, Chicago, Ill., has announced the appointment of three new sales representatives. Harry Weist and Roger Knapp have been assigned to the Chicago office from which they will service metropolitan Chicago and the immediate surrounding areas. Lenoir Black has been temporarily stationed in Natchez, Miss., and will assist Roger Pfau of Memphis, Tenn. Both will service the various industries located in the states of Tennessee, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma and the state of Texas.

### Announces New Stabilizer

Advance Solvents and Chemical Corp., New York, N. Y., has announced the development of a new liquid barium cadmium compound called "Advastab X23-30." The clear liquid stabilizer, having a specific gravity of 1.059, is suited for straight polyvinyl chloride as well as copolymer resins. It is recommended for all types of vinyl operations such as calendering, extrusion and plastisol applications. The company states that no epoxy plasticizer is necessary in the formulation to improve the heat and light stabilization properties. Clarity and long term heat stability is obtainable with "Advastab X23-30" alone in formulations containing only DOP or other primary plasticizers. The stabilizer has been tested in a number of resins and has been found to give good results. The addition of zinc stabilizers is not recommended with this compound. Although "Advastab X23-30" is a barium cadmium compound, its tendency to stain with hydrogen sulfide is reduced. Vinyl compounds stabilized with it will normally pass the standard hydrogen sulfide test.

### New Stabilizing Plasticizer

A new stabilizing-plasticizer of the epoxy type is now available in pilot plant quantities from the Baker Castor Oil Co., New York, N.Y. The new product is distinguished from ordinary epoxidized oils by marked solubility in alcohols, higher viscosity, and greater resistance to gasolines, aliphatic solvents and oils, due to an acetoxy modification of its structure. Designated "Estynox 308," it stabilizes such polymers as nitrocellulose, ethylcellulose, cellulose acetate butyrate, polyvinyl chloride, and chlorinated and synthetic rubbers, against heat and ultraviolet light. In vinyl compounds requiring low marring (non-softening and non-crazing) of lacquer and plastic surfaces, and resistance to gasoline and oil extraction, Estynox 308 has been found to be superior to other epoxy and chemical-type plasticizers. In oil-resistant synthetic rubber compounds, Estynox 308 provides low oil and gasoline extraction, good heat resistance, and moderate low temperature flexibility, the company states.

### Fortisan-36 In Production

Celanese Corp. of America, New York, N. Y., has begun the commercial production of "Fortisan-36" at its plant in Rome, Ga. Fortisan-36, a new super-strong industrial fiber, is said to have properties of great strength, low elongation and dimensional stability which indicate a bright potential for it in such fields as V-belts, power transmission belting, high pressure hose, conveyor belts, truck tires, plastic laminates, fibers, paper reinforcement, oil hose and tarpaulins. Fortisan-36 will be available initially in 800 and 1600 denier continuous filatment.

**Have some comments to make? Write a letter to the editor! (See page 490).**

## SWEDISH INSTITUTION HEARS D'IANNI SPEAK ON SYNTHETIC

Dr. James D. D'Ianni, assistant to the vice-president in charge of research and development for the Goodyear Tire & Rubber Co., addressed the Fall Meeting of the Swedish Institution of Rubber Technology which was held in Stockholm, Sweden, on December 9 and 10. Dr. D'Ianni spoke on "Current Status of GR-S Developments in America." Leading scientists from various European nations participated in the program, designed to review recent developments in the field of rubber technology.

Dr. D'Ianni, in his paper, described the developments which followed the transfer of the synthetic rubber facilities from government ownership to private hands. He also reviewed statistics on the production and consumption of rubber in 1955.

The speaker also discussed the relative importance of synthetic rubber in the United States, as contrasted to the rest of the world. Dr. D'Ianni reported on present development programs in the United States to extend the use of synthetic rubber to heavy duty applications, such as in truck and bus tires.

Another highlight of his presentation included a comparison between natural and synthetic rubbers, based upon factory performance in mixing, processing and tire-building operations, as well as passenger tire tests and end-use applications.

Dr. D'Ianni also showed a series of slides depicting Goodyear's polymerization research and development facilities at its two synthetic rubber plants, in Akron and at Houston, Texas.

The speaker concluded by pointing out that continuation of intensive research and development efforts in the GR-S field will unquestionably extend the range of application of such polymers beyond anything contemplated heretofore. In the final analysis, he said, the coming battle between natural and synthetic will be fought over the twin factors of price and performance. The old master, natural rubber, will find the young upstart, synthetic rubber, a most formidable competitor, Dr. D'Ianni stated.

### Producing Di-isodecyl Phthalate

The Ohio-Apex Division of the Food Machinery and Chemical Corp., Nitro, West Va., has announced that due to favorable results of extensive testing and increased interest, di-isodecyl phthalate is now being commercially produced. The company has produced this plasticizer experimentally for some time. Di-isodecyl phthalate is a primary plasticizer for most resins and imparts permanent flexibility, good low temperature flexibility, heat and light stability, low migration, low water extraction and very good hand and drape, Ohio-Apex claims. In standard tests, di-isodecyl phthalate shows less volatile loss than other widely used plasticizers, it is claimed. It is also stated that in aging tests the material proves substantially superior in regard to retention of low temperature properties.

### German Rubber Conference Set

The German Rubber Society has announced that it will hold its next international conference on June 7 to 9 in Hamburg, Germany. Rubber technologists from nine countries will deliver papers on current problems in the chemistry, physics and technology of rubber; on studies carried out in the field of tire engineering and testing techniques, and on the development of textiles and fabrics used in rubber goods. The program will consist of about 20 papers and will include plant visits. Preprints of the complete lectures will be sent to those who participate in the conference. At the conference itself, the authors will present only summaries of their papers so that more time will be available for discussions. Those interested in attending the conference should write for an application form to: Geschaftsstelle der Deutschen Kautschuk-Gesellschaft, Frankfurt/Main, Mainzer Landstrasse 66, Germany.

### Named to New Sales Post

J. V. Carlin, Jr., has been named assistant general sales manager of the Acme Rubber Manufacturing Co. of Trenton, N. J. He will assist J. V. Carlin, Sr., general sales manager. Mr. Carlin, Jr., majored in marketing at the Wharton School of the University of Pennsylvania, graduating in 1937. He entered the mechanical rubber goods business directly from the University, in a sales capacity. During World War II, he served in the U. S. Navy. He left the Navy in 1946 as a lieutenant commander. After joining Acme Rubber in 1947, he serviced the Philadelphia territory.

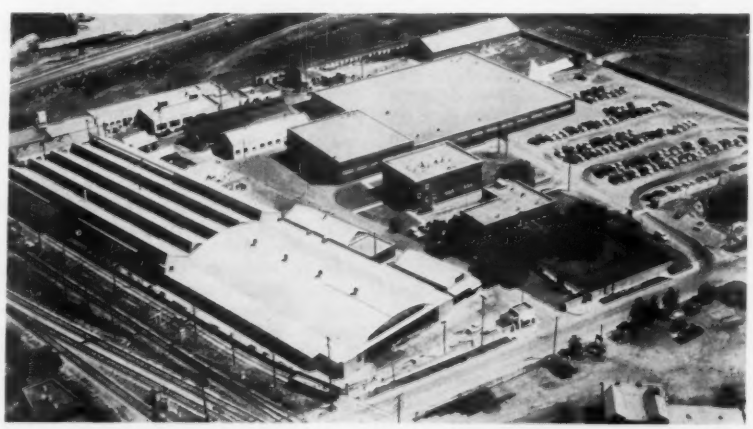
### Plant Maintenance Show

A group of 45 outstanding experts, drawn from all types of industries, will lead the discussions at the 7th Plant Maintenance & Engineering Conference which opens in Convention Hall, Philadelphia, Penna., on January 23, 1956. The conference will extend for three days, while the Plant Maintenance & Engineering Show will run for an additional day. Clapp & Poliak, Inc., New York exposition management firm, produces both events. The show, which is being held in the East for the first time since 1952, is one of the largest annual industrial expositions in the country. More than 20,000 executives are expected to attend the show. The conference, which usually attracts about 2,500 engineers, is the largest of its kind. Most conference sessions are general in nature and cover all types of industries. However, five industries will receive special attention with separate sessions devoted to each. These include air transport, chemical, petroleum refining, paper mill and paper product, and textile.

### Borden Acquires Two Firms

Borden Co., New York, N. Y., has acquired the capital stock of the American Resinous Chemicals Corp., Peabody, Mass., and Reslac Chemicals, Inc., Chicago, Ill. Purchase prices were not disclosed. The acquisitions were made to further diversify Borden's activity in thermoplastics, according to Augustine R. Marusi, vice-president for chemical operations. There will be no changes in management, operating procedure, or personnel of the companies, the Borden executive stated.

## GUIBERSON CORP. ANNOUNCES EXPANSION OF FACILITIES IN DALLAS



Start of construction on a large new oil field equipment manufacturing plant as well as expansion of its rubber plant has been announced by the Guiberson Corp. of Dallas, Texas. Completion of the expansion program will give the company an increase in manufacturing plant working area of more than 80%. Rubber plant working area will have been increased by over 65%. The new single story brick building to be constructed will incorporate many modern facilities and will be completely fire-proof. Covered shipping dock facilities to accommodate twelve trucks will be available. Company officials stated that increased demand for its oil field equipment and molded rubber products made the expansion necessary. The photograph above shows Guiberson plants and office buildings with a super-imposed drawing of the new manufacturing building (indicated by white arrow).

## RMA PREDICTS A CONTINUANCE OF GOOD BUSINESS FOR 1956

U. S. rubber consumption in 1955 ran more than 22% over consumption in 1954, the Rubber Manufacturers Association has reported. By year end, the industry consumed more than 1,500,000 long tons of new rubber, an all time high. In addition, it is estimated that reclaimed rubber consumption reached 312,000 tons.

The industry used 1,233,012 long tons of new rubber in 1954. Consumption in 1955 exceeded by more than 12 percent the 1,338,309 long tons consumed in 1953, the previous peak year, RMA said in its annual roundup of activity in the rubber manufacturing industry's many product divisions. Noting that the industry has doubled its consumption every decade since the turn of the century, RMA President Ross R. Ormsby stated that every product division had shared in posting new records over the past 12 months.

Pneumatic tire production, bellwether of the industry tonnagewise, topped the previous record by more than 15 million units. Production of truck-bus, passenger-motorcycle and agricultural tires totalled 115,090,000 units as against 99,950,000 in 1953, the previous peak, and 92,205,000 in 1954.

The volume of business in non-tire products passed the $2 billion mark for the first time. The previous high was in 1953 when the figure was placed at $1,956,777,000. These manufacturing groups include rubber footwear, industrial rubber goods, latex foam products, molded, extruded and lathe-cut products, belting and hose, adhesives, rubber flooring, heels and soles, rubber drug sundries, hard rubber and coated fabrics among others.

### *Latex Foam Growth*

Conspicuous among these was latex foam products of all types which have had a spectacular growth in the past 10 years. With its wider use in automobiles and buses and its expanding use in the bedding and upholstery fields, foam accounted for a large proportion of the estimated 160,000 tons of liquid latex consumed in 1955, as compared with 132,000 tons in 1954.

General industrial expansion and the broad demands for appliances sparked by the high level of home construction were reflected in record production of belt, hose, molded and extruded goods, and flooring. The production curve for those products was paralleled in rubber hospital and surgical goods, and rubber sundries in the field of infants' and sports goods, the RMA reported.

Viewing 1956 from the new rubber consumption and rubber goods production plateaus reached at the year's end, the Association expressed confidence that the industry will maintain a high level of activity over the next 12 months.

The 1955 rubber consumption record was made possible only by high production achieved in the synthetic plants, Mr. Ormsby said. Following the transfer from government to private hands last spring, actual output exceeded the rated capacity of those plants.

Mr. Ormsby pointed out that this high rate of synthetic rubber production not only bridged the gap between demand and overall short world supply of new rubber, "It also exercised a braking effect on the natural rubber market."

The Association predicted that substantial expansions of U. S. synthetic rubber producing capacity announced over recent months would further stabilize raw materials costs as new units come into production. Total synthetic rubber production reached an annual rate of 1,057,000 long tons in October and general purpose synthetic rubber (GR-S) reached an annual rate of 869,760 long tons. The highest annual rate of production of GR-S achieved under government operation since World War II was 842,964 long tons in May 1953—but, that was when all facilities were being operated, including the largest single plant, at Institute, West Va., which is now inactive and still in government hands.

### *Supply-Demand Pressure*

Despite the pressure of high demand on short supply throughout the year, the Association noted that the prices on various types of synthetic rubber have held at essentially the same level as that under government operation. In that same period, spot closing prices on the Commodity Exchange for natural rubber in the grade of No. 1 Ribbed Smoked Sheets ranged from 29¾ cents to 52 cents a pound between March 8 and Dec. 5, 1955.

In approving sale of the synthetic plants to private industry, Congress required "moral" pledges of the buyers to hold production of synthetic ruber at a level high enough to assure an adequate supply at fair prices to all non-producers of synthetic rubber who are rubber consumers. "As regards synthetic rubber, the record to date indicates that this new industry has met those conditions in every respect," Mr. Ormsby said.

The Association said it was the composite view of industry experts that U. S. consumption would reach approximately 1,480,000 long tons of new rubber in 1956. World rubber consumption in 1956 was estimated at a new record of 2,980,000 long tons.

To meet this demand, it was estimated that producers of natural and synthetic would market 3,190,000 long tons of new rubber, leaving an estimated 210,000 long tons for absorption into industry and government stocks. With the free world's synthetic rubber production at less than 1,100,000 long tons in 1955, RMA said the industry estimated it would rise to 1,315,000 long tons by 1956 and 1,500,000 long tons by 1957.

Factory employment in the rubber manufacturing industry averaged 214,500 production and maintenance employees for the first 9 months of 1955 as compared with 192,600 for the same period of 1954. It should be pointed out that in the summer of 1954 two major strikes in the industry affected this employment figure, whereas in 1955, collective bargaining negotiations were concluded without any major work stoppages. The most recent Bureau of Labor Statistics report indicates that average hourly earnings in the Tire & Tube Industry rose from $2.25 per hour in September 1954 to $2.45 in September 1955. Additional increases in manufacturing costs, not reflected in these average hourly earnings figures, resulted from the increased pension, insurance, vacation and holiday benefits granted to employees in 1955.

Although the industry in the United States is now using synthetic rubber to meet more than 60% of its new rubber needs, it still consumes substantial quantities of crude in the 30 grades covered by RMA Type Descriptions and Packing Specifications. Produced in widely separated areas by people of many tongues and being an agricultural product influenced by different soils and climates, natural rubber is not susceptible to the quality controls possible in the production of man-made rubber.

### *Natural Rubber Problems*

Uniform physical properties and cleanliness have been an important industry problem since the earliest days of natural rubber. A major step was taken toward the solution of those problems in 1955. Meeting in New York under the auspices of the RMA and the Rubber Trade Association of New York, 75 delegates from 23 rubber organizations in 10 other countries set in motion machinery designed to bring all commercially marketed natural rubber within the limits at first of 36 and ultimately 30 universally agreed types. A proposal to implement these recommendations will be circulated to all interested organizations in the world by the RMA and the RTANY early in 1955. This is the first time in the 120-year history of rubber manufacturing that the many diverse elements of the industry have come anywhere near such complete agreement on natural rubber quality standards, RMA states.

RMA Breakdown of Pneumatic Tire Production by Type

| | *1953* | *1954* | *1955* |
|---|---|---|---|
| Passenger & Motorcycle | 81,504,000 | 76,858,000 | 97,000,000 |
| Truck-Bus | 14,690,000 | 12,347,000 | 14,300,000 |
| Farm Tractor-Implement | 3,756,000 | 3,000,000 | 3,790,000 |
| Total | 99,950,000 | 92,205,000 | 115,090,000 |

## Ferro Plans Expansion

Ferro Corp., Cleveland, Ohio, has announced plans for a new $240,000 expansion program, including a new building and its equipment, for the company's color division. With the addition of the new building, the laboratory and manufacturing area will be increased to over 60,000 square feet, the company said.

## PHILADELPHIA GROUP ANNOUNCES NEW RUBBER TECHNOLOGY COURSE

A. J. DiMaggio (Firestone), chairman of the Educational Committee of the Philadelphia Rubber Group, has announced that the group is completing arrangements for the course in Basic Rubber Technology to be given by the group in cooperation with Villanova University. The course will begin on Monday, February 6 and will be held on every Monday following. It will cost participants $30 to take the course, plus an additional $3 for the compiled lectures. Students may take the course for credit or audit. It carries a two semester hour credit toward a master's degree in chemical engineering. There follows below a list of lecture topics and lecturers announced to date:

*February 6*—General Introduction by Dr. B. S. Garvey, Sharples Chemicals Division, Pennsylvania Salt Manufacturing Co.

*February 13*—"Natural Rubber" by Dr. H. S. Yuen, Villanova University.

*February 20*—"Butadiene Polymers" by Dr. P. G. Carpenter, Phillips Petroleum Co.

*February 27*—"Vulcanization of Synthetic & Natural Rubber Compounds" by Mr. A. R. Davis, American Cyanamid Co.

*March 5* — "Reinforcement — Carbon Black" by Mr. John Snyder, Columbian Carbon Co.

*March 12* — "Reinforcement — Non-Black Fillers & Reinforcing Agents" by Mr. Ralph Wolf, Columbia-Southern Chemical Corp.

*March 19* — "Antioxidants & Waxes" by Mr. Gus Maassen, R. T. Vanderbilt.

*March 26* — "Softeners, Plasticizers, Extenders, Peptizers" by Mr. F. M. McMillan, Shell Development Co.

*April 9* — "Testing & Testing Equipment" (To be announced).

*April 16* — "Processing & Processing Equipment" by Mr. P. D. Bowers, Firestone Tire & Rubber Co.

*April 23* — "Latices & Foam Rubber" by Mr. A. L. Back, American Foam Rubber Co.

*April 30* — "Neoprene & Acrylic Rubbers" (To be announced).

*May 7* — "Hypalon & Polyester Rubbers" (To be announced).

*May 14* — "Butyl" (To be announced).

*May 21* — "Nitrile" by Mr. George Daum, B. F. Goodrich Chem. Co.

*May 21* — "Silicones" by Mr. George Konkle, Dow Corning Corp.

*May 28* — "Reclaim" by Mr. John Ball, Midwest Rubber Reclaiming Co.

*May 28* — "Thiokol" by Mr. J. R. Panek, Thiokol Chemical Corp.

### New Naugatuck Publications

Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., has commenced publication of a new series of bulletins under the name of "Naugatuck Rubber Chemicals". Volume 1, Number 1 of the new series is devoted to "Polygard", the non-staining stabilizer. The bulletin discusses the use of the material in all types of synthetic rubber including tire compounds. Copies of the new bulletin are available from the company.

## Coming Events

**Jan. 18-20.** Society of Plastics Engineers, 12th Annual Technical Conference, Hotel Statler, Cleveland, Ohio.

**Jan. 27.** Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

**Feb. 3-5.** Boston Rubber Group, Ski Outing, Bartlett Hotel, Bartlett, New Hampshire.

**Feb. 3.** Detroit Rubber and Plastics Group, Detroit Leland Hotel, Detroit, Michigan.

**Feb. 9.** Fort Wayne Rubber and Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

**Feb. 17.** Chicago Rubber Group, Furniture Club, Chicago, Ill.

**Feb. 21.** Elastomer and Plastics Group, Applications of Cellular Synthetic Materials.

**Feb. 27 to Mar. 2.** American Society for Testing Materials, Committee Week, Hotel Statler, Buffalo, N. Y.

**Mar. 15.** Elastomer and Plastics Group.

**Mar. 16.** Chicago Rubber Group, Furniture Club, Chicago, Ill.

**Apr. 6.** Akron Rubber Group, Mayflower Hotel, Akron, Ohio.

**Apr. 12.** Fort Wayne Rubber and Plastics Group, Hotel Van Orman, Fort Wayne, Ind.

**Apr. 17.** Elastomer and Plastics Group.

**Apr. 27.** Chicago Rubber Group, Furniture Club, Chicago, Ill.

**May 15.** Elastomer and Plastics Group.

**May 16-18.** Division of Rubber Chemistry, A.C.S., Hotel Cleveland, Cleveland, Ohio.

**June 17-22.** American Society for Testing Materials, 59th Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

**Sept. 19-21.** Division of Rubber Chemistry, A.C.S., Chalfonte-Haddon Hall, Atlantic City, N. J.

### Koppers Purchases Durethene

Koppers Co., Inc., Pittsburgh, Penna., has purchased 80% of the common stock of the Durethene Corp., makers of polyethylene film and tubing. Under terms of the agreement with Carl A. Raabe, president and sole owner of Durethene, Koppers acquired its controlling interest in a straight cash deal. The concern, which has a plant in Chicago, Ill., and in Los Angeles, Calif., will be operated as a partially-owned subsidiary of Koppers. A large plant to house the Chicago operations of Durethene is expected to be completed in April.

## SO. OHIO ELECTS OFFICERS; HOLDS GALA CHRISTMAS PARTY

The Southern Ohio Rubber Group held its Annual Christmas Party on December 10th at the Miami Valley Golf Club, Dayton, Ohio. A feature of the meeting was an announcement of the results of an election of officers for the 1956 season. James R. Wall (Inland Mfg.), chairman-elect for 1955, was automatically elevated to chairman for 1956. Other officers are: *Secretary,* Russell J. Hoskin (Inland Mfg.); *Treasurer,* L. Donald Neu (Premier Rubber). Edward N. Cunningham (Precision Rubber), was named chairman-elect, to take office in 1957.

The following members were elected as directors of the group: Harold Schweller (Inland Mfg.), Robert Treue (Dayton Rubber), and Richard Loges (Columbian Carbon).

The committee in charge of the Christmas party was under the chairmanship of I. L. Wolk (Dayton Rubber). Members of the committee included: J. E. Feldman (Inland Mfg.), L. H. Bruce (Naugatuck Chemical), L. J. Keyes (Dayton Rubber), W. H. Dietz (DuPont), S. J. Miller (DuBois), E. Moorman (Dayton Rubber), R. C. Waymire (Inland Mfg.), and N. Wissinger (Dayton Rubber).

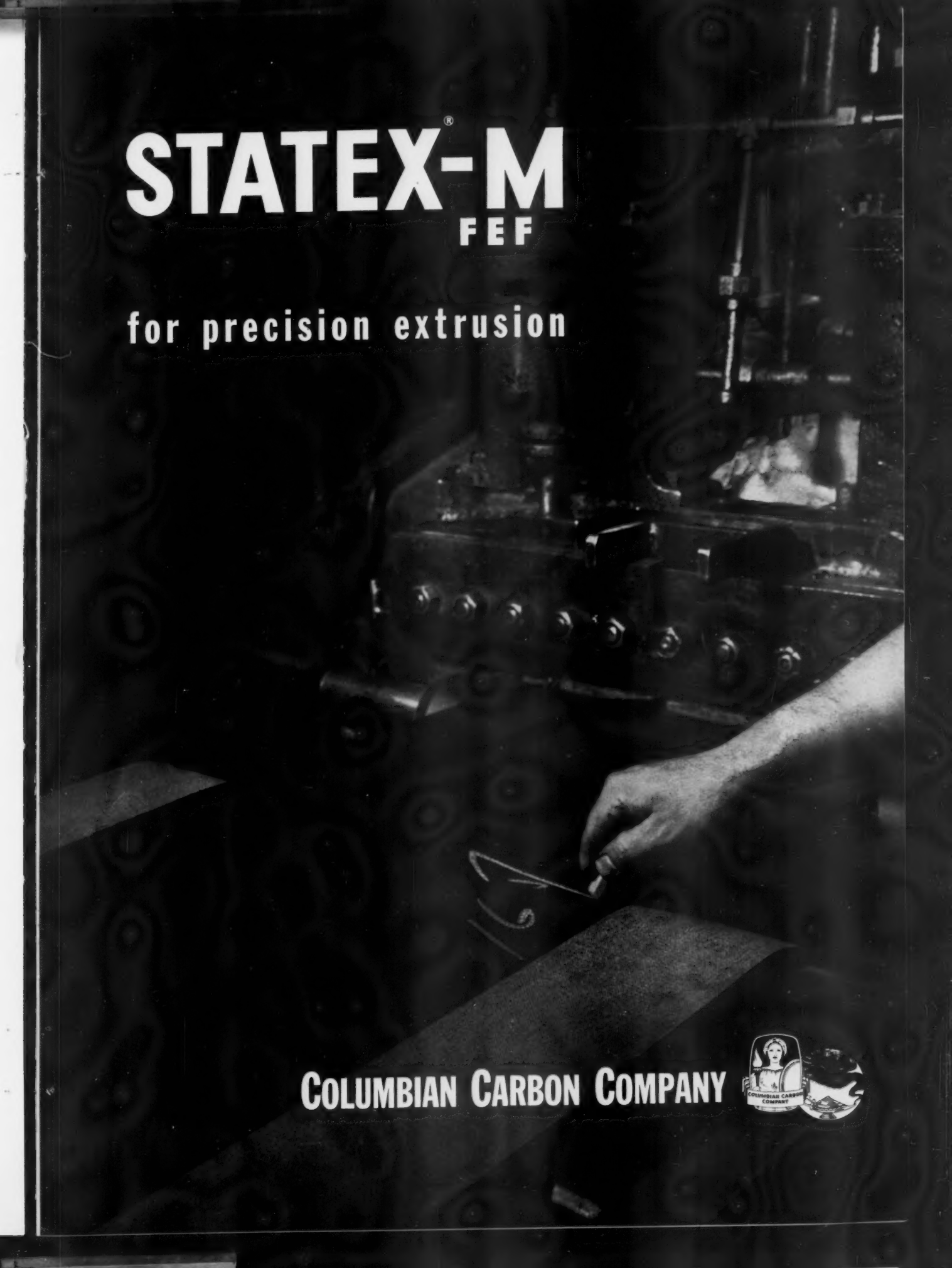
Approximately 250 members and guests attended the meeting at which each lady present received a travel alarm clock in a leather case. The program consisted of a dinner, a drawing for door prizes, card games for those who wished, and dancing.

### Detroit Announces 1956 Officers

The Detroit Rubber and Plastics Group has announced the results of an election of new officers for the 1956 season. Members elected to office include: *Chairman,* H. W. Hoerauf (U. S. Rubber); *Vice-Chairman,* H. F. Jacober (Baldwin Rubber); *Secretary,* E. J. Kvet, Jr. (Detroit Arsenal); *Treasurer,* W. F. Miller (Yale Rubber). The following members have been elected chairmen of the committees noted: *Membership* W. A. Wiard (Dow Corning); *Educational,* R. W. Malcolmson (DuPont); *Publicity,* W. D. Wilson (R. T. Vanderbilt); *Entertainment,* R. C. Chilton (Permalastic Products), and *Program,* S. R. Schaeffer (U.S. Rubber). The next meeting of the group will be held on February 3 at the Detroit-Leland Hotel. Dr. Calvin Yoran of the Brown Rubber Co. will speak on vinyl foams. E. B. Newton of the B. F. Goodrich Research Center will be the after dinner speaker. Mr. Newton will deliver a paper on "Ameripol S-N, the New Synthetic Natural Rubber."

### New Plant for Shell Chemical

The Shell Chemical Corp. has announced plans to start construction on a methyl ethyl ketone plant at Norco, La., with a capacity of 40,000,000 pounds a year. It is scheduled to begin production early in 1957. Methyl ethyl ketone is used chiefly in the surface coating and vinyl resin industries and is finding increasing applications as a chemical intermediate, according to R. C. McCurdy, president.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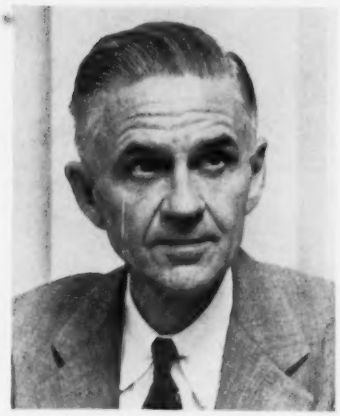
## Casey Announces Retirement



Robert E. Casey

Robert E. Casey, marketing coordinator for the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., has announced his retirement effective December 31, 1955. Widely known in the rubber industry, Mr. Casey was associated with the company for thirty-three years, having joined as a chemist in 1922. Mr. Casey received a B. S. degree from the University of Vermont in 1919. He spent the year following his graduation as an instructor in chemistry at the University, and then joined the old Calco Chemical Co. at Bound Brook, N. J., where he remained until he joined U. S. Rubber. In 1926, Mr. Casey joined Naugatuck Chemical's sales force. He remained active in sales work for the remainder of his career with the company. In 1936, Mr. Casey was appointed sales manager of rubber chemicals, reclaimed rubber and rubber labels. He held this post until 1941 when he was named general sales manager of the division. In 1955, Mr. Casey was appointed marketing coordinator for the Naugatuck Chemical Division, the post he held at his retirement. Born in Richmond, Vermont, in 1899, Mr. Casey attended the public schools of Jericho, Vt. He is a member of Phi Beta Kappa and Phi Mu Delta and many technical and fraternal organizations. In retirement, he will reside at Woodbridge, Conn., with Mrs. Casey.

## Baker Castor Oil Names Two

Baker Castor Oil Co., New York, N. Y., has announced the appointment of John V. Reilly and Martin H. Smith as sales representatives working out of the New York home office. Mr. Reilly will service the New York State area, excepting Staten Island and Long Island. Prior to joining Baker, he served in a similar capacity with A. Gross and Co. and, for the past four years, with the Harchem Division of Wallace and Tiernan, Inc. Mr. Smith has been assigned the Brooklyn-Queens-Long Island territory. His previous affiliations have been with General Chemicals Corp. as a development engineer, with the Hercules Powder Co. as an applications chemist and, more recently, with the Atlas Mineral Products Co. as a technical sales representative.

## Static Sleuth Devised

Researchers of the Dayton Rubber Co., Dayton, Ohio, have thrown a new light on the subject of static electricity around V-belts. The experts recommend holding a 1/25th watt neon glow bulb near a belt as a simple means for maintenance men and safety engineers to check for potentially dangerous static electricity. The bulb actually will light if there is static electricity around the belt, they report. They suggest attaching the bulb to the end of a pencil to keep it from being knocked out of the checker's hand.

## Personnel Changes at Stalwart

Stalwart Rubber Co., Bedford, Ohio, has announced reorganization of executive personnel at both the Bedford main plant and office as well as the Jasper Rubber Division, Jasper, Ga. Officers and directors of the firm are H. W. Osborn, president, chairman of the board and treasurer; A. W. MacAlonan, vice-president and director of sales; E. H. Osborn, vice-president and director of purchasing and personnel; W. E. Farrington, vice-president; F. K. Byers, Jr., secretary; W. P. Lindauer, assistant secretary and Mrs. Alice C. Weisenbach, assistant treasurer. Factory operations at the Bedford plant will now be under the joint direction of J. K. Kravetz, R. R. Long and A. V. Volpe. Mr. Kravetz has also been named chief chemist of the firm to succeed Mr. Ralph H. Tyrell, vice-president, who retired on November 1, 1955 after 23 years with Stalwart. Officers of the Stalwart operation at Jasper, Ga. are H. W. Osborn, president; Mr. MacAlonan, vice-president; Mr. Lindauer, vice-president; Mr. Byers, secretary, and E. H. Osborn, treasurer. Plant production at Jasper is headed by Mr. Kravetz, general manager; Everett Atherton, production manager and Everett Ingram, factory manager.

## Developing Smaller Size Tire

According to E. J. Thomas, president of the Goodyear Tire & Rubber Co., Akron, Ohio, Goodyear is now in the "later stages" of developing a smaller 14-inch diameter tire for automobiles. Mr. Thomas, however, did not indicate when 14-inch tires would appear on new car models. "These new tires which we have pioneered will be of lesser wheel diameter, bigger cross sections and 20-pound inflation, all of which will give a better and safer ride than ever before," Mr. Thomas said. U. S. cars now have 15-inch wheel diameters carrying tires that usually specify an inflation pressure of 24 pounds. Earlier this year, there were trade reports that tire companies were working on 14-inch tires. Trade sources in Akron state the 14-inch tires will appear on some 1957 new car models. Mr. Thomas said the smaller diameter tires would not mean a reduction in the use of rubber in tires, since they would be wider, or fatter.

## Tudder Joins Mapico Color

Paul A. Tudder

Paul A. Tudder has joined the Technical Service Department of the Mapico Color Division of the Columbian Carbon Co. at Trenton, N. J. Mr. Tudder, a graduate of Muhlenberg College, has been engaged in the production of water dispersions of pigments at the Kentucky Color & Chemical Co., Inc. He was previously with United Wallpaper, and has also had pigment experience with General Dyestuff Corp.

## Expanding Torrance Facility

What is said to be the first cold high solids latex to be manufactured west of the Rockies will be produced in new facilities to be built at the Torrance, Calif., synthetic rubber plant of the Shell Chemical Corp. Construction is to start immediately. The latex facilities will be part of a general program of additions and improvements designed to increase both the diversity and the quality of the plant's output. The plant was not equipped to make cold high solids latex when Shell Chemical bought it from the government earlier this year. The new latex facilities, comprising additional basic reactor capacity as well as latex finishing equipment, are intended to meet a growing demand for this material in the western states. Officials stated that the company, in planning these additions and improvements, was guided by the best available indications of customer preferences as to types and quality of rubber desired in the market. The new equipment to be installed, in addition to increasing the flexibility of the plant for production in normal times will, in a period of national emergency, assist the plant in turning out more of the essential types of rubber than has hitherto been possible.

## Holfast Division in Operation

Dayton Rubber Co., Dayton, Ohio, has opened its new Holfast Division at Atlanta, Ga., as part of a company expansion program to increase manufacturing, warehousing and shipping facilities. The new division will continue to make industrial tapes, particularly for the electrical industry, formerly manufactured by the Holfast Rubber Co. The new division also produces rubber roller and textile machine parts.

### Two New Silastic Gums

Two new base-polymers or "gums" for silicone rubber stocks have been made available by Dow Corning Corp., Midland, Mich. Identified as "Silastic 401 Gum" and "440 Gum", they offer greatly reduced compounding time and increased temperature stability of compounded stocks, the company states. Providing all the characteristic properties of the regular standard silicone rubber gum, 401 Gum can be processed much more rapidly especially in heavily loaded stocks. Laboratory formulations made up of 100 parts 401 Gum and 200 parts titanium dioxide, and 2 parts benzoyl peroxide were compounded in 19 minutes as compared with the 30 minutes required for standard dimethyl silicone gums. Compounds based on 401 Gum also stay soft longer and do not require as much milling prior to use. Dow Corning Silastic 440 Gum is an entirely different polymer, specifically designed for extreme temperature service. It compounds easily, requiring only half the amount of vulcanizing agent needed for standard silicone gums. It also imparts excellent resistance to compression set without the use of additives.

### Develops New Tire Sizes

Dayton Rubber Co., Dayton, Ohio, reports that two new truck tire sizes are now solving an important industry problem of how to increase loads without utilizing higher or longer trailers. This has been made possible by the development of the two new tire sizes now being distributed by the company. They are a 10.3—12 ply and a 10.3—14 ply. These tires are said to give truckers the same carrying capacity as a 10.00—20 tire with approximately the same operating diameter as a 9.00—20. Cubic capacity of the trailer is increased because the truck bed is lower. The new tires must be used only on 7.5 rims to provide the necessary volume of air. They are particularly well adapted to cab-over-engine front wheel operations and to drive wheel and trailer operations which require additional clearance yet carry the loads now being placed on 10.00—20 tires.

### Groups Hold Joint Meeting

The Wellington Waterloo Section and the Ontario Rubber Section of the Chemical Institute of Canada met jointly on November 8th at the Kress Mineral Springs Hotel in Preston, Ont., Canada. Approximately 90 members and guests were in attendance. The subject of the meeting was "Machinery Used in the Manufacture of Flexible Foams." Mr. F. Youngdahl (Mechanical Handling Systems) spoke on machinery for latex foam rubber, and Boyd Hopkins (Girdler) spoke on machinery for vinyl foam. Mr. Kittner (Mobay Chemical) addressed the group, describing the production of urethane foams. The speakers were introduced by Bruce Williams (Dunlop Canada) and thanked by R. Howey (Naugatuck Chemical). Chairman W. H. Bechtel of the Ontario Rubber Section presided at the meeting.

### Kelly Joins Armistead Firm

E. D. Kelly

E. D. Kelly, who served as Director of the Office of Synthetic Rubber of the Federal Facilities Corp. from August, 1952 to mid-1955, has been named as administrative director of George Armistead and Co., international engineering firm of Washington, D. C. Mr. Kelly will assume his duties immediately, having officially terminated his services with the American Watch Association on December 31 to accept his new appointment. George Armistead and Co., widely known engineering firm, was founded in Washington, D. C. in 1945 and specializes in consulting, design and other services for the chemical, petroleum and related industries. It has offices in Los Angeles, California and Athens, Greece, as well as in Washington.

Mr. Kelly, a 45-year-old native Washingtonian has an extensive background in Government service and private industry. He is a graduate of the University of Maryland, receiving his B.S. in mechanical engineering in 1934. During World War II, he occupied various positions with the War Production Board, closing his service as Deputy Director of the Rubber Division. He returned to private industry in 1946 with the American Machine and Foundry Co. from which he was recalled to service with the Economic Cooperation Administration just prior to the Korean War and later selected as Director of the Rubber Division of the National Production Authority. As director of the Office of Synthetic Rubber, he directed operations, production, and sales for 27 synthetic rubber plants and assisted the Rubber Producing Facilities Disposal Commission in the sale of the majority of the facilities. Mr. Kelly's duties in George Armistead and Co. will be of an administrative nature, including representation of the firm in many of its relations with industry and Government.

### Eleonora Debentures Offered

A $500,000, 5% debenture offering of the Eleonora Chemical Corp., a subsidiary of the Pantasote Co., Passaic, N. J., has been placed with private investors, Hans Wyman, Pantasote president, announced recently. The proceeds will be used to finance the construction of a new polyvinyl chloride plant in Passaic.

### Groppe Joins Mares Company

Henry Groppe has joined Joseph R. Mares in his practice as an industrial chemical consultant with offices in the Commerce Building in Houston, Texas. Mr. Groppe was most recently assistant director of development for the Plastics Division of the Monsanto Chemical Co., Texas City, Texas. He began his career in the chemical and petroleum industries as a research and development engineer with the Dow Chemical Co. in Midland, Mich. His experience includes process engineering work in a Texas Co. refinery, refinery operations and process engineering work and a period as assistant to the manager of refining for the Arabian American Oil Co. in Saudi Arabia, and economic evaluation and process design work for Monsanto at Texas City. He is a graduate of the University of Texas.

### Goodyear Research Appointments

Goodyear Tire & Rubber Co., Akron, Ohio, has announced several new appointments to its Research Division. Mrs. Gloria D. Wathen, formerly associated with the General Electric Co., has been appointed to the Physics and Electronics Section. Fred R. King, formerly of the Airfoam Development Department, has been assigned to the Rubber and Plastics Compounding Section of the Research Division. Edward F. Devlin has also been assigned to the Physics and Electronics Section. He holds a Ph.D. in physical and organic chemistry from the University of Notre Dame. Another appointee to the Physics and Electronics Section is Franklin K. Dietzler, formerly associated with the Goodyear Atomic Corp.

### Goodyear England Expanding

Goodyear Tyre & Rubber Co. (Gt. Britain), Ltd., Wolverhampton, England, has announced plans for the construction of a new tire plant in Glasgow, Scotland. A 58-acre site has been acquired and preparation for construction has already begun. Initially, the plant will be concerned only with the production of tires. It is being constructed at a cost of about £3,000,000 and when complete will be the most modern plant in Europe. It is expected that the new facility will be in production in the latter half of 1956. The company had previously announced an £8,000,000 expansion and modernization program at Wolverhampton.

### Fire Hits Ferst Company

Fire, fed by exploding chemicals, swept through the plant of M. A. Ferst, Ltd., in Atlanta, Ga., on December 17. R. H. Ferst, vice-president, reported that damage was heavy, but no estimate of the loss was made. The company manufactures erasers and eraser plugs and caps as well as a line of graphite products. Fire officials stated that exploding drums of graphite and other substances "showered the whole building with blue flames that looked like gasoline burning," and described the fire as the most "stubborn of the year".

### Kinny Named to New Post

Robert D. Kinny

Pennsylvania Industrial Chemical Corp., Clairton, Penna., has announced the establishment of a sales residency in the Cincinnati, Ohio area, working out of the Detroit, Mich., office. Robert D. Kinny will represent the company exclusively on all products available for sales and distribution in the Cincinnati area. Pennsylvania Industrial Chemical Corporation is maintaining its distribution arrangements through Harwick Standard Chemical Co., which is essentially for the rubber industry. Mr. Kinny is a graduate of Michigan State University where he received a degree in Chemical Engineering. He was previously associated with the General Chemical Division of Allied Chemical & Dye Corp. He has represented Pennsylvania Industrial Chemical for two years in the Chicago District.

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### Liner Repair Material

Seiberling Rubber Co., Akron, Ohio, is now producing a special inner liner material for use in repairing tubeless tires. The material is used to replace inner liners on tubeless tires which need section repairs. "Exhaustive testing in the laboratory and under actual road conditions shows that a tubeless tire must have the inner liner replaced over the repaired area when a section repair is made," said W. T. Johnson, the company's general sales manager. If the inner liner stock isn't replaced, air seepage occurs through or around the repair unit. This "wicking action" of the air eventually causes ply separation, rendering the tire useless, he added. "The basic compounding of this inner liner stock is the same as that of the inner liner in Seiberling tubeless tires. It is a normal-curing, tough compound of natural rubber with the same air-retaining qualities found in Butyl-type liners, but it overcomes the disadvantages of Butyl," Mr. Johnson claimed. During vulcanization it will blend perfectly with any type of inner liner used in other manufacturers' tubeless tires, the Seiberling official said. During the first six months of production, the stock will be available directly from the company's Akron headquarters. Later it will be distributed through Seiberling district outlets. The material is packaged in five-pound rolls.

### Atomic Rubber Aids

Discovery of materials that extend the service life of rubber, and rubber products, at least ten times when exposed to atomic radiation was announced recently by the B. F. Goodrich Research Center, Brecksville, Ohio. The materials, added to rubber stocks in process before vulcanization, are called "anti-rads". The company states that because rubber is an important construction material, greater resistance to damage by atomic radiation, assured through these additives, is a valuable contribution. Growing emphasis on uses of atomic energy requires that construction materials be able to withstand radiation. The discovery, made by the research team assigned to this project, will be useful to both military and industrial development in the field of atomic energy.

### New Dayton Passenger Tires

Two completely new lines of safer, longer-riding passenger tires are being introduced by Dayton Rubber Co., Dayton, Ohio. Available in both tubeless and tube-type, the new lines are known as "Dayton Thorobred", guaranteed for 15 months, and "Dayton Thorobred Premium", backed by a 2-year written service guarantee. Improved compounding of the rubber provides a tougher tread which will last many additional road miles while hundreds of safety slots, cut into the tread design, give maximum skid resistance in all directions and all weather, the company states. Tire noise is virtually eliminated by hundreds of "ride silencers" molded into the saw-toothed tread channels. Besides checking vibration, squealing and operating noise, the silencers also are an added safety factor. All rayon cords used in the tires are electronically processed for added blowout protection. Premium styles are available in rayon or nylon construction and both lines have blackwall and whitewall models. The latter features a whitewall protector that guards against scuffing and curb marks.

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### Expanding Titanium Output

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced three projects to boost production of titanium dioxide and said it is considering building a new plant near New Johnsonville, Tenn., to make the white pigment. DuPont will spend about $5,000,000 on the three projects, the company said. They include expansion of present facilities at Baltimore and two projects at the existing Edge Moor, Del., plant. One of the Edge Moor expansion programs had been announced earlier. The proposed expansion will increase DuPont's titanium dioxide output by more than 25%, according to F. H. Weismuller, general manager of the company's pigments department. Titanium dioxide is in short supply currently, he added.

### Named Executive Vice-President

G. Dewey Hynes

J. R. MacDonald, chairman of the board and president of the General Cable Corp., New York, N. Y., has announced the election of G. Dewey Hynes as executive vice-president. Mr. Hynes has resigned as vice-president of the Equitable Life Assurance Society of the United States, effective January 1, 1956, and will take over his new duties with General Cable on that date. He formerly was vice-president and director of the Berkshire Life Insurance Co., Pittsfield, Mass., and prior to that was vice-president of the First National Bank of Montclair, N. J. Mr. Hynes has been a director of General Cable since 1954 and is also a director of the First National Bank of Montclair.

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### New Silicone Rubber Products

Two new intermediate silicone rubber products are now available from the Dow Corning Corp., Midland, Mich. One is a new polymer identified as "Silastic 430 Gum". The other is a reinforced gum, or masterbatch, called "Silastic 432 Base". Designed to exhibit minimum shrinkage during vulcanization, Silastic 430 Gum makes it possible to compound silicone rubbers which in some cases may be molded in conventional organic rubber molds. Parts characterized by extremely high resistance to compression set may be produced without toxic additives and with only a relatively short cure. Silastic 432 Base consists of 80% polymer and 20% Dow Corning Silica, and is believed to be the first silicone rubber masterbatch ever offered. It is easily and rapidly blended with additional fillers or extenders. Inherent low shrink and low compression set characteristics eliminate the need for toxic additives, while compounding with properly selected fillers yields finished silicone rubbers with excellent physical and dielectric properties. Both products are currently available in commercial quantities.

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Coordinated shoes and handbags made of "Breathable Naugahyde" a new material developed by U. S. Rubber with vinyl designs permanently applied to fabric, have been introduced on the market.

# Names in the News

PAUL F. HAND, associated with the General Aniline & Film Corp. since 1948, has been named assistant to the president succeeding John Deutsch, who has resigned to accept a position with Lehman Brothers.

JAMES R. MACDONALD, president and chairman of the board of the General Cable Corp., has been elected a director of the Irving Trust Co., New York, N. Y.

DR. GEORGE E. FOLTZ, formerly associated with the Columbia-Southern Chemical Corp., has joined the research staff of the Neville Chemical Co., Pittsburgh, Penna.

HARRY E. HUMPHREYS, president and chairman of the board of the U. S. Rubber Co. was cited and presented with a gold metal for "distinguished achievement" at the 57th annual dinner of the Pennsylvania Society held in New York City on December 13.

WILLIAM F. MALONEY, associated with the Goodyear Tire & Rubber Co. since 1948, has been appointed to the High Polymer Research Section of the company's Research Division.

WILLIAM B. GOODWIN, formerly associated with Deering Milliken, Inc., has joined the Polychemicals Division of the West Virginia Pulp & Paper Co., Charleston, S. C., for product and uses development work on new products based on lignin.

IRWIN F. HOLLAND has been named special assistant to the manager of the Cutting Tool and Gage Divisions of the Pratt & Whitney Co., and EDWARD J. SHAGES has been named factory manager of both divisions.

ROBERT S. WALLEIGH has rejoined the staff of the National Bureau of Standards as assistant director for administration. He originally joined NBS in 1943. In 1953 he became assistant for administration for the Diamond Ordnance Fuse Laboratories.

JAMES H. BEGLEY, formerly Chicago district sales manager for industrial chemicals of the Stauffer Chemical Co., has been promoted to Western Division sales manager. EDWARD BEATTIE has been named Chicago district sales manager succeeding Mr. Begley.

NORMAN R. BYRD, formerly associated with the DuPont organization, has been appointed to the Organic Research Department of the Research Division, Goodyear Tire & Rubber Co.

DR. A. A. SOMERVILLE, retired vice-president of the R. T. Vanderbilt Co., has been named a member of the board of directors of the Pawling Rubber Co., Pawling, N. Y.

CHARLES E. SAUVAIN, who started with the Mohawk Rubber Co. as an office boy and rose to sales manager, marked his 40th anniversary with the company in December.

J. D. CAMPBELL has been named plant manager at the Lima, Peru facility of the Goodyear Tire & Rubber Co.

WILLIAM H. LEHMBERG, formerly executive vice-president of the American Felt Co., has been elected president succeeding JOHN T. LAWLESS, who will continue as chairman of the board.

MAJOR GENERAL LESLIE E. SIMON, U.S.A., Ret., has been named director of the Research and Development Division of the Carborundum Co., succeeding HARRY C. MARTIN, who is retiring after forty-two years with the company.

WILLIAM H. LEGGETT, formerly associated with the J. R. Stewart Co., Inc., has been named sales engineer by the Acheson Colloids Co., Port Huron, Mich.

HAROLD A. BRITTAIN, assistant to the production manager of Goodyear Foreign Operations, Inc., retired on December 31 after 37 years of service with the company.

CHARLES C. KOZA, formerly associated with the public relations department of the B. F. Goodrich Co., has been named to a new assignment with the advertising and sales promotion department of the B. F. Goodrich Chemical Co.

D. W. CUNNINGHAM, associated with the Seiberling Rubber Co. since 1946, has been appointed manager of the company's newly-established passenger tire sales department. C. C. EDWARDS succeeds Mr. Cunningham as budget sales manager.

E. H. FITCH, manager of the aeronautical products departments of the B. F. Goodrich Co. Tire and Equipment Division, has been elected to the board of directors of the Aviation Distributors and Manufacturers Association.

KENNETH QUINN, formerly associated with the Quaker Rubber Corp., has joined the technical staff of the Moreland Corp.

DR. JAMES Y. OLDSHUE, associated with the Mixing Equipment Co. since 1950, has been promoted to the position of director of research.

HANS WYMAN, president of the Pantasote Co., has been elected president of the Eleonora Chemical Corp., a Pantasote subsidiary.

HARRY W. JULIAN, formerly associated with the Better Ball Co., has joined the Seiberling Rubber Co. as a representative of the government and manufacturers sales department.

### Firestone Receives Service Pin

Harvey S. Firestone, Jr., chairman of the board of the Firestone Tire & Rubber Co., recently received a service pin from Lee R. Jackson, president, for completing 35 years of service with the company. The presentation was made to Mr. Firestone (left) upon his return from a trip to Europe and Africa. Mr. Firestone became associated with the company on November 1, 1920, following his graduation from Princeton University. Two

years later, he was made vice-president and manager of the Firestone Steel Products Co., which position he held until 1926. Meanwhile, he was elected a director and vice-president of the newly-organized Firestone Plantations Co., and placed in charge of its activities. Mr. Firestone became president of Firestone Plantations in 1932. He was elected a director of the Firestone Tire & Rubber Co. in 1919; a vice-president in October, 1929; president in November, 1941, and chairman and chief executive in 1948.

### Hi-Miler Commercial Tire

A new lower-priced truck tire, for replacement use on lightweight delivery trucks, station wagons and house trailers, has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. Named the "Hi-Miler Commercial", this tire is made in the 6.70-15 size, which is applicable to many of the newer vehicles of this type. Company officials said the new tire incorporates all features of the company's long-established Hi-Miler line, yet is priced only slightly higher than original equipment passenger tires (6.70-15) often used on these light vehicles. The new tire, therefore, offers the advantages of a tire built strictly for commercial service, at an ultimate lower cost in heavy service, it is said. Featured in the new tire, as in the rest of the Hi-Miler line, is its flat, husky rib tread, plus a tire body designed for a maximum number of recaps. Used in the construction of this tire are new, tougher rubber compounds, developed to give long wear. Still another feature is the tire's stronger cord, triple-tempered by the company's exclusive (3-T) process, the firm stated.

**Wish to express your views? Write a letter to the editor! (See page 490).**

### Burger Joins Phillips Chemical

Francis W. Burger

Francis W. Burger has been appointed technical sales representative for the Eastern sales district of the Rubber Chemicals Division of the Phillips Chemical Co. Mr. Burger is headquartered at the company's Eastern district branch office, 634 Hospital Trust Building, Providence, R. I. A native of Lynn, Mass., Mr. Burger received his B.S. degree in chemical engineering from the University of Maine in 1942. He joined the Kleistone Rubber Co. at Warren, R. I., in May, 1946, where he has served as chief chemist until his resignation to take the Phillips post. Mr. Burger is a member of the American Chemical Society and of the board of directors of the society's Rubber Division, past chairman of the Rhode Island Rubber Club, and a member of the Boston Rubber Group and the Providence Engineering Society.

### Joins Research Division

Appointment of Teh Fu Yen to the Diene Synthetic Rubbers Section of the Research Division, Goodyear Tire and Rubber Co., Akron, Ohio, has been announced by Dr. H. J. Osterhof, director of research. Dr. Yen graduated from Huachung University in Wuchang, China, with a bachelor of science degree in chemistry. After coming to the United States, he attended West Virginia University where he received a master's degree in organic chemistry, and a Ph.D. in organic chemistry from Virginia Polytechnic Institute. He is a member of the American Chemical Society, the Chemical Society (London), Sigma Xi and Phi Lambda Upsilon.

### Goodyear Chemical Tech Book

The Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has made available a new loose-leaf binder which incorporates technical data on "Pliovic" and "Plio-Tuf" resins. Called "Tech Book for the Plastics Industry", the binder is so designed that as additional information becomes available it can be added. The initial material in the binder covers Pliovic electrical resins and Pliovic dispersion resins, and data on calendering and laminating with Plio-Tuf.

### Singapore Honors Ridley

In a unique tribute, Singapore engaged in a week-long salute from December 10 to 17 honoring the 100th birthday of H. N. Ridley, who introduced the rubber tree to Malaya while directing the botanic gardens, 1888-1912. At that time, rubber cultivation was considered madness. Today, it supports 40% of the population. Mr. Ridley lives in retirement near London's Kew Gardens.

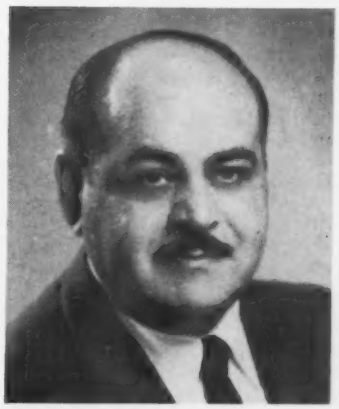
### Fluorocarbon Plastic Laminate

A new fluorocarbon plastic laminate with high temperature and extreme chemical resistance has been developed by the M. W. Kellogg Co., Jersey City, N. J. This new laminate, consisting of a thin—10-12 mil—continuous layer of "Kel-F" plastic on glass cloth, can be adhesive-bonded to almost any contoured surface. Vessels ranging from rectangular plating tanks to complex reactors involving flanged pipe connections and dished heads, have been lined throughout with the material. Economy-wise, it has been found that this Kel-F plastic laminate installed on carbon steel is more than competitive with many alloy metals. Still lower material costs are expected for a lighter gage laminate designed for applications requiring the special anti-sticking qualities of this fluorocarbon plastic. A Kellogg spokesman said that the development of this material gives designers a new lining for tanks, vessels, reactors, drums, pails, pipe, chutes, hoppers, fume hoods, and ducts. Other applications envisioned include surfacing for laboratory bench tops, chemical plant floors, foundry parting boards, concrete forms, conveyor belting, resin casting forms, and foam rubber molds. It is also expected that, as surfacing, the laminate will considerably broaden the effective application range of reinforced plastic or honeycomb structures, the company states.

### Technical Bulletins Available

National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y., has issued a series of six technical bulletins on "Nacconates" (diisocyanates), believed to contain the most comprehensive data so far made available on the properties and reactivity of this interesting group of polyurethan chemicals. National Technical Bulletin I-17 is a fundamental brochure on diisocyanates as a class. Its 24 pages include generic properties, data on 27 basic reactions common to all diisocyanates, eight pages of suggested uses and a list of 132 literature references. Five supplementary technical bulletins give specific technical data on the Nacconates now being produced by the National Aniline Division. The complete series of six bulletins or any of the individual bulletins may be had without cost by writing on your business letterhead to: National Aniline Division, Allied Chemical & Dye Corp., 40 Rector Street, New York 6, N. Y.

### Jesse S. Young Co. Formed



Jesse S. Young

Jesse S. Young, formerly assistant to the president of the Advance Solvents & Chemical Corp., has announced the formation of the Jesse S. Young Co. at 2 Park Avenue, New York 16, N. Y. This company will act as sales agents in the metropolitan New York area for manufacturers of chemicals and machinery for the rubber, plastics, paint, printing ink and allied industries. To date, the new company has arranged to represent Advance Solvents, Resyn Corp., Troy Engine & Machinery Co., and other well-known manufacturers of chemicals and solvents. Mr. Young was graduated from the College of the City of New York in 1937 with a B.S. degree in chemistry. In that year he joined Advance Solvents and remained until he formed his new company. He is a member of many technical and fraternal organizations.

### Phillips Expanding Facilities

Phillips Chemical Co., Akron, Ohio, has announced plans to expand by an additional 22% the capacity of its Plains copolymer plant near Borger, Texas. This expansion is in addition to the 15% recently announced by the company. The production capacity of the adjacent Plains butadiene plant also will be increased to provide the additional butadiene used by the copolymer plant in the manufacture of synthetic rubber. Increased customer demand for "Philprene" synthetic rubber has necessitated this expansion, company officials said. Phillips purchased the butadiene and copolymer plants from the government in April, 1955. Prior to the purchase of the plants, Phillips had operated them under contract for the government. With these plants under its private ownership and operation, the company makes and sells to rubber fabricators more than 20 different types of synthetic rubber materials bearing its "Philprene" trademark. Construction of the new facilities will begin immediately and is expected to be completed in the first quarter of 1957.

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### Atlas Realigns Research Set-Up

Atlas Powder Co., Wilmington, Del., has basically realigned its chemical research and development organization and staff to strengthen long-range research and product diversification programs. It is expected that the reorganization will result in a significant expansion of chemical research facilities and personnel in the next few years, with increased emphasis on basic research. The new set-up is designed to facilitate effective research teamwork by clearly defining areas of responsibility and by simplifying evaluation and control of research projects. The company's basic research activities are expected to derive particular benefit from this new approach.

Joining the Atlas staff to direct the Chemical Research Department phase of the work is Dr. Walter H. C. Rueggeberg, formerly director of organic research and development for the Tennessee Corp. A graduate of Johns Hopkins University's School of High Studies in Chemistry, Dr. Rueggeberg was with Carbide and Carbon Chemicals Co. before the war. From 1942 to 1950, he served in the U. S. Army Chemical Corps as an officer and civilian, his assignment at the close of the period being as Assistant Scientific Director of the Corps' Chemical and Radiological Laboratories. He joined Tennessee in 1950 to establish their organic chemicals research program.

The Chemical Engineering Department will continue to be headed by Marshall T. Sanders, who has been on the Atlas staff since 1917, and who has directed the firm's chemical engineering work since 1945. Director of the new Product Development Department is F. Faxon Ogden, who joined Atlas in September after 20 years with Monsanto Chemical Co. A chemistry graduate from Cornell University, Mr. Ogden served Monsanto as an assistant product development director.

Assistant directors of the reorganized research staff include: Chemical Research Department—Dr. Robert S. Rose, Jr., Dr. John D. Brandner and Dr. John W. LeMaistre. Chemical Engineering Department—Dr. J. Neal Addoms. Product Development Department—William C. Griffin and Dr. George O. Rudkin, Jr. The assistant directors have been associated with Atlas for some years with the exception of Dr. Rudkin, who joined Atlas in August after previous service with Chas. Pfizer & Co., and R. K. Laros Co.

### Expanding Research Facilities

Ground has been broken for the new addition to the research center of the Stauffer Chemical Co. at Chauncey, N.Y. Adding over 8000 square feet of chemical laboratory and office floor space, the addition will cost more than a quarter million dollars and should be completed by July first next year. This addition is part of a master plan which provides for still further expansion in the future. The entire facilities are completely air conditioned. The most modern research equipment and facilities have been provided, the company states. Three other company research centers are located at Richmond, Torrance, and Mountain View, California.

### Chemical Industries Exposition

Displays of chemical substances, chemical manufactures, and manufacturing equipment were shown at the Twenty-Fifth Exposition of Chemical Industries held at the Commercial Museum and Convention Hall, Philadelphia, Penna., December 5 to 9. Advances were shown in such non-metallic materials as: hose, tubes and fittings made with Teflon and hard rubber piping made with polystyrene, polyethylene and various rubber-resin compounds. In addition, displays showing pumps, fans, valves and heat exchangers made with an epoxy resin called "Durcon," were also shown. Such plastic materials as Teflon, Kel-F and the silicones were featured in a display of mechanical packings. Another exhibit featured molded polyethylene drums and tanks. The Exposition was under the management of E. K. Stevens, president of the International Exposition Co., 480 Lexington Ave., New York 17, N. Y. Exposition headquarters were located in Room 104, Convention Hall, during the Exposition.

### Glancy Retires from Hood

Warren E. Glancy, for the past ten years manager of development for the Hood Rubber Co., a division of the B. F. Goodrich Co., retired as of December 31, 1955. Mr. Glancy joined Hood Rubber on May 4, 1914 after receiving his degree of bachelor of science in chemical engineering from M.I.T. and one year's service on the instructing staff at that institution. During his service at Hood he has been engaged in technical work relating to tires, footwear and industrial products. He is a member of the American Chemical Society, American Association for the Advancement of Science and the American Society for Testing Materials. He has served as a councilor of the Division of Rubber Chemistry and as chairman of the Boston Rubber Group. He has also served as the chairman of several subcommittees of Committees D-11 and D-13, A.S.T.M. He is the author of a number of papers relating to Hard Rubber, and the testing and manufacture of rubber footwear.

### Recent Naugatuck Publications

Among recent technical reports issued by the Naugatuck Chemical Division of the U. S. Rubber Co., Naugatuck, Conn., are the following:

"Polygard Stabilized GR-S" (Bulletin 190).

"G-M-F and Dibenzo G-M-F for Heat-Resistant and Fast-Curing Butyl Stocks" by B. N. Larsen (Compounding Research Report No. 30).

"Methazate, Ethazate, Butazate and Arazate—Dithiocarbamate Accelerators" by C. W. Lawson (Compounding Research Report No. 29).

"Laurex—A Fatty Acid Activator and Plasticizer" by C. W. Lawson and I. E. Cutting (Compounding Research Report No. 32).

"Beutene, Hepteen Base, Trimene Base and Trimene—Aldehydeamine Accelerators" by C. W. Lawson (Compounding Research Report No. 33).

"Tuex and Ethyl Tuex" by W. B. Curtis and R. R. Barnhart (Compounding Research Report No. 31).

"Kralac A-EP—A High Styrene Resin" by I. E. Cutting (Compounding Research Report No. 34).

### Poncet Davis Appeals Case

Attorneys for Poncet Davis, president of the Robbins Tire & Rubber Co., Tuscumbia, Ala., who has been convicted of owing the United States government $729,000 in income taxes, have appealed the case to the United States Supreme Court. Washington sources advise that it will be sometime in February before it will be decided if the case will be admitted to the court for a hearing. If the case is admitted, it will be set down for a hearing. If it is not admitted, Mr. Davis will have to pay his $40,000 fine and go to federal prison to begin serving a five-year term. Mr. Davis' attorneys asked the Supreme Court to review the case because, it is stated, the government failed to prove its case regarding earnings of Robbins Tire & Rubber. Mr. Davis was convicted early in 1954 and lost his appeal to the Sixth Circuit Court of Appeals in October of 1955.

"Looks like the professor really has something this time!"

### Bingham Named Vice-President

Chris F. Bingham

Chris F. Bingham, formerly director of sales for the Columbia-Southern Chemical Corp., Pittsburgh, Penna., has been named vice-president in charge of sales succeeding W. I. Galliher, who retired from the company effective December 31. In other appointments, H. W. Gleichert was named vice-president in charge of market research and development; W. F. Newton was named director of sales, and P. A. Fodor, Jr., was named assistant director of sales. During his fifteen years with Columbia-Southern, Mr. Bingham has held various supervisory sales positions. Mr. Bingham is a graduate of Virginia Polytechnic Institute with a B.S. degree in chemical engineering. Mr. Galliher terminated a sales career which began as director of sales for the Columbia Chemical Division of the Pittsburgh Plate Glass Co. in 1930. In 1947, he was appointed executive sales manager for both Columbia Chemical and the Southern Alkali Corp., a Pittsburgh Plate subsidiary. Since 1951, Mr. Galliher has served as vice-president in charge of sales for the Columbia-Southern Chemical Corp., which was formed as a wholly-owned subsidiary of Pittsburgh Plate. Prior to his most recent appointment, Mr. Gleichert had served as assistant to the vice-president in charge of sales. He has been with the organization since 1920. Mr. Newton has served as manager of market research and development since 1945. He started with the organization in 1941. Mr. Fodor transfers to Pittsburgh after having served as district sales manager at Philadelphia since 1952. He has been with the company since 1940.

### Huber Forms New Division

J. M. Huber Corp., New York, N. Y., has formed a new sales division to serve the plastics, flooring, adhesives, ceramics, paint, ink, food and pesticide industries. Called the General Industries Division, it will handle sales and marketing of Huber clays, carbon blacks, special pigments and conditioners now being used by these process industries. Ralph R. Browning, Jr., has been named manager of the new division. He will be assisted by D. P. McAdoo as assistant divisional manager.

## FINANCIAL BRIEFS

Calvin S. Yoran, vice-president of the Brown Rubber Co., has acquired 500 shares of common stock. Direct ownership amounts to 1,500 shares.

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The board of directors of the National Rubber Machinery Co., Akron, Ohio, has declared a regular quarterly dividend of 35c per share and an extra dividend of 20c per share which was payable on December 17, to shareholders of record at the close of business on December 9.

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Directors of the Dayton Rubber Co. have voted a 10% stock dividend on the common shares and also increased the quarterly dividend to 35c from 25c. The stock dividend will be distributed on February 15 and fractional shares will be paid in cash. The quarterly cash dividend will be disbursed on January 25.

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At a meeting held in Boston, Mass., on December 28, directors of the Boston Woven Hose & Rubber Co. declared a dividend of 15c per share on common stock of record as of February 15, 1956. The dividend is payable on February 25, 1956.

### Increasing Resorcinol Production

To meet increasing demands for resorcinol Koppers Co., Inc., Pittsburgh, Penna., will expand its Petrolia, Penna., plant to bring about a 40% increase in production. Expansion plans call for the addition of new facilities, new equipment, and renovating some of the existing buildings to provide additional production areas. Modifications will be made in the present water system as well as in the existing process systems. Mr. Walker explained that Koppers expansion of its Petrolia operations reflects the increased demand for resorcinol. Resorcinol is a major ingredient used by the rubber industry in the treatment of tire cord. Other extensive uses of resorcinol include the making of dyes, pharmaceuticals, and explosive primers. It also is used in leather tanning and as a major ingredient in waterproof adhesives for wood and corrugated paper. Resorcinol was first made in the United States in the early twenties at Petrolia at the present site of Koppers plant. Koppers purchased the plant from the Pennsylvania Coal Products Co. in 1947.

### Elected Polymer Division Head

Dr. Raymond F. Boyer, director of plastics research for the Dow Chemical Co., Midland, Mich., has been elected chairman of the Division of Polymer Chemistry of the American Chemical Society for 1956. Dr. Boyer succeeds Professor Herman F. Mark of the Institute of Polymer Chemistry, Polytechnic Institute of Brooklyn. Dr. Thomas G. Fox, laboratory head of the Rohm & Haas Co., Philadelphia, Penna., has been elected vice-chairman of the division and Dr. Joseph Dec, assistant manager of paper and organic products of the Johns-Manville Corp., Manville, N. J., has been re-elected secretary-treasurer.

### Joins Midwest Rubber Reclaiming

Howard Erwin

Mr. Howard Erwin, former Deputy Director of the Office of Synthetic Rubber, Washington, D. C. has been appointed manager of the Paramount, Calif. plant of the Midwest Rubber Reclaiming Co., effective December 1st. Mr. Erwin received a B.S. degree in chemical engineering at Iowa State College in 1932, a Professional Degree in Engineering in 1947 from the same school, and since 1943 has had extensive experience in the rubber industry. As a chemical engineer, he aided in starting up the Goodyear Synthetic Rubber Corporation's GR-S plant in Los Angeles in 1943. In 1945 he was promoted to technical superintendent in charge of the laboratory and chemical engineering work in that GR-S plant, where he remained until 1949 when the plant was closed. At that time he was transferred to Cleveland, Ohio, where he spent 2 years contacting the rubber and paint trades as technical sales representative for Goodyear's Chemical Division. In 1950, Mr. Erwin joined the Kentucky Synthetic Corp. as director of engineering, and later was promoted to plant manager. He was appointed Deputy Director of the Office of Synthetic Rubber of the Federal Facilities Corp. in November, 1953. This organization directed the operation of the government rubber program. When the government rubber plants were sold in the early Fall of 1955, he joined the Midwest organization.

### Constructing Micro-Cel Plant

Johns-Manville Corp., New York, N. Y., has announced the near completion of a new plant at Lompoc, Calif., for the manufacture of an entirely new line of synthetic calcium silicates. The new plant is located at the company's diatomite mine in Lompoc. Full-scale production of the new products, under the trade name "Micro-Cel," is expected to begin early next year. Diatomite finds use in rubber as a reinforcing material, particularly in synthetic rubber soling.

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# Financial News

## FIRESTONE SHOWS RECORD NET OF $55,378,916 IN FISCAL '55

According to the annual report of the Firestone Tire & Rubber Co., Akron, Ohio, the company's net income in the fiscal year ended October 31, 1955, amounted to $55,378,916, a rise of 36.7% from the $40,509,944 earned in the previous fiscal year. This is said to be the first time that the annual profit of any rubber company ever exceeded $50,000,000. The fiscal 1955 profit, after providing $58,900,000 for taxes, is equal to $6.81 a share on 8,082,636 common shares outstanding and compares with $5.02 a share for the prior year, after giving effect to a two-for-one stock split. The tax bill for fiscal 1954 was $41,000,000. Net sales in fiscal 1955 totaled $1,114,870,187, a gain of 21.7% over the $916,047,040 volume a year earlier.

Profits of foreign subsidiaries were $13,715,290, from which the company provided a reserve of $393,962 for profits that could not be remitted during the year because of exchange shortages. Devaluation of foreign assets resulted in a charge of $3,542,736 to a reserve from income in previous years.

The company spent $55,723,138 on plant and equipment additions and improvements in fiscal 1955. This included $14,175,000 paid to the government for the purchase of synthetic rubber plants at Akron, Ohio and Lake Charles, La. The company claims that the addition of the two plants, plus expansion of natural rubber production at its plantations in Liberia, makes it the world's largest producer of rubber.

This was the second time that Firestone's sales topped a billion dollars. The previous high was $1,029,402,000 in 1953. Net working capital as of October 31, 1955, amounted to $308,000,000, up $8,000,000 from the total as of October 31, 1954.

### Armstrong Rubber Co.

Year Ended September 30: Net income of $2,734,133, which is equal to $4.95 a common share, compared with $1,669,458, or $4.02 a share, in the year ended September 30, 1954. Net sales in fiscal 1955 amounted to $68,981,866, against $55,376,084 in the previous fiscal year. The statement covers the company and its wholly-owned subsidiaries, Armstrong Rubber Manufacturing Co. of Des Moines, Iowa, and Armstrong-Norwalk Rubber Corp., Norwalk, Conn.

### Plastic Wire & Cable Corp.

Year to October 1: Net income of $322,548, which is equal to $1.98 a share, compared with $248,968, or $1.70 a share, in the year ended October 1, 1954.

**Take issue with something in this edition? Write a letter to the editor! (See page 490).**

### Cooper Tire & Rubber Co.

Nine Months to September 30: Net income of $269,639, which is equal to $1.72 a share, compared with $10,843,060, or 38c a share, in the first nine months of 1954. Net sales in the first nine months of the current year totaled $16,358,197, against $10,843,060 in the first nine months of 1954.

### Monroe Auto Equipment Co.

Year Ended June 30: Net income of $62,193, which is equal to 2c a share, compared with $72,614, or 4c a share, in the preceding fiscal year. Net sales in the year ended June 30, 1955, totaled $12,253,080, against $16,200,983 in the preceding fiscal year.

### Electric Auto-Lite Co.

Nine Months to September 30: Net profit of $6,797,122, which is equal to $4.25 a share, compared with $120,796, or $.08 a share, in the corresponding period of the previous year.

### Okonite Company

Nine Months Ended September 30: Net profit of $1,123,261, which is equal to $6.19 a share, compared with $701,866, or $4.11 a share, in the first nine months of the previous year.

### O'Sullivan Rubber Corp.

Nine Months to September 30: Net loss of $20,820, compared with a net income of $51,080, which is equal to 7c a share in the nine months ended September 30, 1954.

### Jenkins Bros., Inc.

Six Months to June 30: Net income of $393,367, which is equal to $3.08 a share, compared with $551,881, or $4.33 a share, in the first six months of the preceding year.

### Thor Buys Cincinnati Rubber

Sale of the Cincinnati Rubber Manufacturing Co., Cincinnati, Ohio, to the Thor Power Tool Co. of Aurora, Ill., for $3,500,000 was announced on December 17. John F. Joseph, chairman of the board of the Cincinnati concern, said operations would be continued at the plant in Cincinnati with all personnel being retained. L. P. Darnell is president of the Cincinnati company. Mr. Joseph, Mr. Darnell and E. J. Heinzerling of Cincinnati Rubber will join the board of the Thor company. The Cincinnati concern manufactures industrial rubber products including conveyor and transmission belts, hose and rubber-covered rolls. It employs approximately 150 persons.

### Steel Grip Truck Tire

A new truck tire of unique wire tread construction, designed primarily for winter use, has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. Victor Holt, Jr., vice-president in charge of tire sales for the firm, said the new tire features a multitude of tiny steel claws which bite into ice, hard-packed snow and provide maximum grip on all slick highways. Called the "Steel Grip," this tire offers truckers a new high degree of protection against hazardous driving conditions and road delays, as well as long-lasting traction, according to Mr. Holt. The new tire is now available from Goodyear dealers in the highway range sizes, Mr. Holt said.

The outstanding ability of this tire to grip slippery surfaces stems from its unusual curved rib or "traction wave" design and the thousands of steel claws imbedded in the tread. These wave-like ribs distribute the claw action over the entire width of the tread, thus virtually eliminating ice grooving—a common cause of wheel spinning. Another feature of the new product is the great compressive strength of its "Dub-L-Twist" steel wire, which prevents excessive breakage and holds the wire in the tire until tread design is well worn away, the Goodyear vice-president pointed out. Then when the wire finally wears down, tiny pores remain in the tread to give a tractionizing effect. This provides still further mileage before retreading is necessary. Triangular rubber blocks between the tire's ribs produce a self-cleaning action which also enhances its traction qualities in mud, snow and slush.

Developed over a period of several years, this tire has been thoroughly tested commercially under very severe service conditions, said Mr. Holt. He also disclosed that truck operators report the wire coils imbedded in the Steel Grip's tread offer additional resistance to cuts, resulting in a higher percentage of recappable carcasses. He stated too, that practical applications show the Steel Grip especially advantageous for operators of truck fleets, school buses and for fire department use, where safety and traction in all kinds of weather is of utmost importance.

### Stainless Steel Latex Pipeline

A new stainless steel ship unloading line, is being placed into operation to augment the modern latex handling facilities at Latex and Rubber, Inc., Baltimore, Md. This new stainless steel pipeline is six inches in diameter and may be the only one of its kind in the country being used for such a purpose. This pipeline connects the ship discharge pump with the depot's underground reinforced concrete storage tanks. Corrosion resistance was not the major reason for using stainless steel; stainless was chosen because of its easy cleanability and maintenance as well as its negligible effect on latex odor and stability. The company states that great care has been exercised to eliminate all short bends and other points which would increase turbulence. This new line is expected to greatly increase the discharging rate and give a lifetime of low maintenance care.

## Named Research Director

### Bernard C. Barton

Appointment of Bernard C. Barton, as director of research and development for the Texas-U.S. Chemical Co., New York, N. Y., has been announced by William P. Gee, president. Texas-U.S. Chemical is jointly owned by the Texas Co. and the U.S. Rubber Co. Dr. Barton will direct Texas-U.S. Chemical research and development work on the production of improved synthetic rubbers and the expanded use of petrochemicals. Dr. Barton was formerly head of the Rubber Applications and Synthetic Rubber Research Department of the General Laboratories of U.S. Rubber. He joined the staff of the General Laboratories of U.S. Rubber in 1939. Dr. Barton's primary interests have been in the development and use of synthetic rubbers and in the basic study of vulcanization and aging of elastomers.

A native of Crawfordsville, Indiana, Dr. Barton received a Bachelor of Arts degree from Wabash College and his Ph.D. degree in chemistry in 1939, from Brown University. He is a member of Phi Beta Kappa, Sigma Xi, and the American Chemical Society.

## May Dispose of Gro-Cord

According to Forest Moor, president of the Gro-Cord Rubber Co., Lima, Ohio, the company, now in the midst of a strike, will be disposed of. The board of directors of the company have given Mr. Moor authority to sell, move, merge or liquidate the company. Gro-Cord's second plant at Tillsonburgh, Ont., Canada, will also be disposed of, Mr. Moor stated. The strike in which Gro-Cord is involved has lasted about three months with the union holding firm for a two-year contract with a wage reopener at the end of the year. The company offered a three and one-half year contract with no clause for reopening during the period. Union negotiators have indicated willingness to accept a 9c hourly wage decrease from the present $1.94 hourly average. The company said the reduction was needed to make Gro-Cord products competitive. Spokesmen for Local 85, U.R.W., stated they will not accept a contract unless the company rehires the union president and vice-president both of whom were recently dismissed for "serious misconduct" on the picket lines.

## Aid to Varicose Veins

According to the *Journal of the American Medical Association*, a zippered sponge rubber boot has been developed to relieve severe varicose veins of the lower leg. The boot is made of sponge rubber one-quarter of an inch thick. The edges are closed with adhesive tape and a zipper-type fastener. A bandage is wrapped around the booted area for additional support. The leg muscle's action against the sponge rubber causes a pumping action while walking, helping relieve the varicose condition.

## Announce Design Engineering Show

The first Design Engineering Show will be held at Convention Hall, Philadelphia, May 14 to 17, 1956, it was announced by Clapp and Poliak, Inc., New York exposition firm which will manage the event. The show is the first to be devoted exclusively to the needs of those engineers who design products for consumer and industrial use. The new show will have on exhibit all types of original equipment which go into the manufacture of a finished product. The show will provide, on an annual basis, a complete view of developments in the design engineering function of industry. To supplement exhibits, a conference will be conducted at which papers will consider various applications of design engineering theory and practice.

The show is an outgrowth of another exposition, previously held in New York and Chicago, called the Basic Materials Exposition. The new exposition will feature such items as rubber processing equipment, plastics producing and fabricating machinery, wire making machinery, textile and chemical processing machinery and railroad equipment. Design engineers and executives who wish to obtain advance registration cards or hotel information may write Clapp and Poliak, Inc., 341 Madison Ave., New York 17, N. Y.

## Dunlop to Expand Estates

Dunlop Plantations, Ltd., London, England, has announced the appropriation of £5,500,000 for expanding its Malayan rubber estates. Donald W. Hawkins, director and general manager of Dunlop, termed the move an expression of confidence in natural rubber in Malaya. Recently, the firm announced plans for a new synthetic rubber plant in Britain at a cost of £9,000,000.

## New York Holds Xmas Party

The New York Rubber Group held its Annual Christmas Party on December 9 at the Henry Hudson Hotel in New York City with approximately 550 members and guests in attendance. The program consisted of a cocktail hour which was followed by a dinner, entertainment and a drawing for door prizes.

## U.S. Rubber Promotes Kelton

### Herbert M. Kelton

Herbert M. Kelton has been elected a director, a vice-president, chairman of the Finance Committee and member of the Executive Committee of the U. S. Rubber Co., New York, N. Y., effective January 1, 1956. Mr. Kelton was formerly treasurer. He succeeds Arthur Surkamp as a vice-president, chairman of the Finance Committee and member of the Executive Committee. Mr. Surkamp retired from active management on December 31 but continues as a director and member of the Finance Committee. At the same time, Frank J. McGrath, formerly an assistant treasurer, was elected to succeed Mr. Kelton as treasurer. Alva F. Myers, formerly an assistant treasurer, was elected senior assistant treasurer, and W. Richard Fish, formerly assistant to treasurer, was elected an assistant treasurer.

## IFI Holds Washington Meeting

More than 50 representatives of leading rubber, chemical, petroleum, metallurgical and related companies attended a Subscriber's Conference held by Information For Industry, Inc. on December 5-6 at Hotel Statler in Washington, D. C. Purpose of the conference, presided over by Lynn J. Bartlett, IFI president, was to discuss future development of Information For Industry's Uniterm Index, a unique fingertip source of complete information covering 6000 chemical patents issued in the United States during 1955. Focal points of the discussion were the format and content of the 1956 edition of the Uniterm Index, and a presentation by Information For Industry officials of current plans for back indexing all chemical patents now in force so that subscribers may be offered a complete 17-year continuity of chemical patents. The utilization and management of patent data has for years been a factor of high cost to industry. The Uniterm Index, representing literally millions of dollars worth of knowledge, is a practical, easy-to-use system designed to make all chemical patent information cheaply and readily available.

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# News in Brief

Specifications and descriptions of sixty-eight different rubber hose for industrial and agricultural use are presented in a new eight-page catalog digest issued by the Thermoid Co., Trenton, N. J.

Herman H. Sticht Co., Inc., 27 Park Place, New York, N. Y., has issued a new bulletin which describes their "Magic Wand" electrostatic neutralizer bars. Ask for Bulletin No. 126.

An eight-page booklet issued by Shell Chemical Corp. contains sales specifications and data for thirty organic chemicals. The booklet is designed as a quick reference for data on solvents and resins.

The Washington, D. C., offices of U. S. Rubber has been moved from the Munsey Bldg. to 1700 K St., N.W., suites 1001 and 1002. The company's Washington staff and assistant to the president occupy the office.

Automobile safety belts—that highway officials say can reduce the death toll from motor vehicle accidents by as much as 81 percent—are being made available through the Firestone dealer and store distribution system.

"Pliobond" adhesive-plastic, manufactured by Goodyear, has found a new use in the tobacco industry. The adhesive is applied as a sealant to close all crevices and openings in tobacco warehouses prior to fumigation.

A new process of treating denim yarns to improve their colorfastness and wearing qualities has been developed by Southern Research Institute. The process treats denim yarns with a Hycar latex developed by Goodrich Chemical.

Arthur D. Little, Inc., consulting research firm, has opened a branch office in Washington, D. C. The office is located in the Cafritz Bldg., Suite 606, 1625 Eye Street, N.W.

Hercules Powder Co. has announced a substantial addition to its new oxychemical plant in Gibbstown, N. J. About three-million pounds of para-cresol will annualy be produced in the new facilities.

Bacon Industries, Inc., 192 Pleasant St., Watertown, Mass., has issued Technical Data Sheet No. 103; O-ring price lists; single cavity mold listing and prices and a data sheet on a new Teflon-silicone compound.

Isopropyl ether is described in a new technical bulletin issued by Carbide & Carbon. It discusses uses for isopropyl ether and contains specifications and solubility data. Copies are available from Carbide & Carbon Chemicals Co., 30 E. 42nd St., New York 17, N. Y.

Presto Manufacturing Co., Inc., has announced the addition to its staff of Miss Pat Harmon as Sales Manager. Miss Harmon will concentrate on the promotion of the new polyvinyl "Gai-Foam," manufactured by Great American Industries, Inc.

U. S. Rubber Co. has introduced four additions to its "Naugahyde" upholstery line. They include two new patterns and a new finish in Elastic Naugahyde and a new pattern in "Breathable Naugahyde."

Two manufacturers of rubber products, Acushnet Process Co. of New Bedford, Mass., and General Latex & Chemical Corp. of Cambridge, Mass., have been voted "Joshua" award certificates for distinguished use of match book advertising during 1955.

A 35-foot automobile trailer fitted out as a model store has been put on the road as a mobile sales training unit by the Firestone Tire & Rubber Co. The trailer is making two-day stops at Firestone dealers and stores in Ontario, Canada.

A chart that will provide service personnel with complete information about the servicing of tubeless tires has been made available to distributors and dealers by the Dayton Rubber Co.

Emery Industries, Inc., Dept. 5, Carew Tower, Cincinnati 2, Ohio, has issued a brochure on its line of stearic acids, oleic acids, hydrogenated fatty acids, glycerides, plasticizers and oleic esters.

Carbide & Carbon Chemicals Co. has announced that 1,5 Pentanediol is now available in tank car, tank truck and drum car load quantities. Various esters of 1,5 pentanediol have been suggested as plasticizers for vinyl polymers.

Tenney Engineering, Inc., has appointed Foster N. Reynolds & Associates as the company's new southern sales representatives. The Reynolds firm will service all guided missile and aircraft development projects in this area.

A new illustrated data sheet on its line of water hose has been issued by Goodrich and is available without charge. Sizes, pressures, coupling information and construction features for each type of hose are listed in the data sheet.

The American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y., has published its 1955 edition of "Charting Steel's Progress", a graphic facts book on the iron and steel industry.

**Like to make a suggestion to the industry? Write a letter to the editor! (See page 490).**

### Doubles Plant Facilities

Burgess Pigment Co. of Sandersville, Ga., reports completion of new plant facilities and equipment—now in full operation—which have increased their productive capacity by 100%. In addition, Burgess is now offering, for the first time, "Iceberg K", a newly-improved whitening agent for use in the rubber, paper, and plastics industries, and particularly adapted as an extruder for titanium dioxide. The newly expanded facilities will make available larger quantities, and ensure a dependable source of supply, of the top-quality Burgess line of clays and pigments.

*Shown above is a view of the new calciner put into operation by Burgess Pigment.*

Published for the benefit of shoe designers, manufacturers and retailers, an interesting booklet entitled "The Proper Way to Cushion a Shoe," has been published by the Airfoam Division of Goodyear.

Rohm & Haas Co., Philadelphia, Penna. has issued a technical report on "Dytol Fatty Alcohols" which includes specifications, typical properties and suggested uses of the company's various grades of "Dytols."

"To Enrich Mankind" is the title of a 25-minute color motion picture prepared for the American Society of Mechanical Engineers. The film is designed to explain the significance of the role mechanical engineering plays in the development of America.

Mona Industries, Inc., Paterson, N. J. manufacturers of detergents, wetting agents, emulsifiers and dispersing agents has announced an increase in its production facilities by 300%.

The results of laboratory tests and service records over the past several years on an improved Butyl compound for high-voltage cables has been published by Anaconda Wire & Cable. Ask for Bulletin No. EB-27.

The General Services Administration has sold at public auction a 52-acre chemical plant, complete with all machinery, fixtures and equipment to the Union Carbide & Carbon Corp. for $405,000. The plant, built in 1941 to turn out 70,000 tons of calcium carbide annually for the war effort, cost $3,500,000.

### Brands Opens Consulting Office

George B. Brands

George B. Brands, who for the past five years has been a technological consultant associated with the R. R. Olin Laboratories, Inc., has announced the opening of his own consulting office in Akron, Ohio. R. R. Olin Laboratories is a consulting organization servicing the rubber and plastics industries, and their suppliers and consumers. Mr. Brands recently sold his interest in this organization and concurrently resigned as vice-president and treasurer, posts which he held for the past three years. Mr. Brands has a broad background in almost all phases of rubber manufacture and testing, from the initial laboratory work on through production of many varied products, developing not only compounds, but also molds and special manufacturing and testing equipment, for many and varied companies, both large and small. He specializes in products wherein quality is the prime consideration.

Before joining the Olin organization in 1950, Mr. Brands was with the Rubber Section of the Armstrong Cork Co., in their Central Research Laboratories. He holds a B.S. in chemistry from the University of Akron, and has done graduate work there, at Franklin and Marshall College, and at M.I.T. He is a member of the A.C.S., its Akron Section, and its Rubber Division; he is also a member of the Akron and Philadelphia Rubber Groups, and is on the staff of the "Akron Technical Topics".

### Expanding Butadiene Plant

Plans for a $4,350,000 expansion program at the butadiene plant operated by Petroleum Chemicals, Inc., at Lake Charles, La., have been announced by F. M. Simpson, vice-president and general manager. Petroleum Chemicals, Inc. is owned jointly by the Continental Oil Co. and Cities Service Co. Capacity of the plant, said Mr. Simpson, will be increased from 63,000 tons to 79,000 tons of butadiene annually. Work on the project under contract to the Fluor Corp., will start within the next few weeks and is scheduled for completion by next Fall. Petroleum Chemicals, Inc. was organized by Conoco and Cities Service in 1954 and earlier this year purchased the butadiene plant from the United States for approximately $17,500,000.

### National Plastics Exposition

Advanced registration for the 1956 National Plastics Exposition sponsored by the Society of the Plastics Industry, Inc., at the new Coliseum in New York City is more than 42% ahead of registrations received at this time for the 1954 Exposition held in Cleveland, Ohio. William C. Conroy, Chairman of the Exposition Committee, reported the news recently at a drawing held in New York City to determine the distribution of booth space among advanced registrants. According to Mr. Conroy, the number of exhibitors signed up—178—already exceeds the total number of exhibitors registered during the 1954 Exposition. As an indication of the growth of the industry, 55 companies will exhibit at the National Plastics Exposition for the first time and total exhibitors may approach 250 by the time the show opens, he said.

Scheduled for June 11th to 15th at the new Coliseum in New York City, the exposition will give representatives of business and industry a look at all phases of the $1,500,000,000 plastics industry. Companies throughout the country and abroad will come to New York to show their new products, techniques, materials, machinery, and services. Exhibitors already registered include molders; laminators; extruders; fabricators; manufacturers of reinforced plastics products; processors of film, sheeting, and coated fabrics; raw materials suppliers; machinery and equipment manufacturers; tool, die, and mold makers. The show, which will not be open to the general public, is expected to draw more than 20,000 representatives from industry, business, retailing, government, and education.

### Plaskon Polyethylene Lubricants

Barrett Division, Allied Chemical & Dye Corp., New York, N. Y., has announced the development of "Plaskon Polyethylene Lubricants," low molecular weight, low melting polymers. The lubricants find use in both the rubber and vinyl industries because of their ability to improve processing, particularly in stocks that are difficult to handle due to excessive tack at elevated temperatures. Plaskon Polyethylene Lubricants disperse readily, have exceptionally high compatibility, do not bloom or interfere with ply adhesion, and are non-staining. Only small proportions are required to provide optimal properties, the company states. As detackifying and mold release agents, as processing aids to improve filler and pigment dispersion, in increasing calendering and extrusion rates, and in providing excellent chemical and electrical resistance, Plaskon Polyethylene Lubricants are said to contribute to better over-all performance of elastomer end products. The lubricants are available in three grades—two differing in molecular weight range and a special emulsifiable grade. Both standard grades can be obtained in either powdered or extruded pellet form.

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### Boring Named General Manager

Claude L. Boring

James A. Currie, president of the Erie Foundry Co., Erie, Penna., has announced the appointment of Claude L. Boring as general manager. Mr. Boring has been with Erie Foundry for one year, serving as assistant to the president. He was previously divisional manager of the Plomb Tool Co.

### New Products Show Planned

The United States' first National New Products, New Methods and Patents exposition will be held in Detroit, Mich., in the fall of 1956 under the combined sponsorship of civic, management and labor organizations in cooperation with private industry and state, municipal and federal government agencies. An advisory council of top executives in industry from all sections of the country is to be named shortly. Thomas Reid of the Ford Motor Co., general chairman of the event, announced the show and said definite dates and site would be announced at an early date. Mr. Reid said the purpose of the show is "to develop new business, to help existing businesses to cut costs and diversify production by making easily available the results of costly research and inventiveness in the field of new products and new methods and to help stabilize employment at new and higher levels." Offices of the show will be at 927 Book Building in Detroit.

### Additives for Ozone Resistance

Additives which improve ozone resistance of GR-S rubber polymers as much as tenfold are described in a research report made available by the Office of Technical Services. This report, PB 111722 "Development of Ozone and/or Oxygen Resistant Polymers" (final technical report), Burke Research for U. S. Army Ordnance Corps, 1954, may be ordered from OTS, U. S. Department of Commerce, Washington 25, D. C., price $2.75. It contains 105 pages. In an experimental program designed to improve the ozone resistance of tire stocks, the Army Ordnance Corps, explored the possibilities of modifying GR-S polymer compounds with additives and of developing new elastomers with better inherent ozone resistance. Experiments are detailed in the report.

### Air Force Aging Tests

Comparative effects of outdoor exposure and accelerated aging on cotton, rayon, nylon and other synthetics, plastic materials, and coated fabrics are described in a report just released to industry by the Office of Technical Services, U. S. Department of Commerce. The research described in this report was done by the U. S. Air Force Air Materials Command to determine the reliability of an accelerated weathering unit (Type X1A, no water spray) for testing fabrics, as compared with outdoor exposure tests. In the outdoor tests, samples of 40 different fabrics were exposed to the sun at an elevated test site in New Mexico for periods from one to nine months. Samples of the same fabrics were subjected to accelerated aging in the weathering unit for periods ranging from 20 to 100 hours. Breaking strength and tearing strength properties were used as a basis of comparison of the two methods of aging. Findings of both types of tests were generally in agreement. Certain fabrics, however, gave results after outdoor exposure which were not predicted by accelerated aging. It is suggested that, since weathering unit results are not always conclusive, the unit should be used chiefly as a screening device. Testing methods are described and results charted in this report, PB 111761 *"Textiles: Accelerated Weathering Versus Outdoor Exposure Tests"*. October, 1950, 49 pages. Available from OTS, U. S. Department of Commerce, Washington 25, D. C., at a price of $1.25.

### Seeks to Acquire A. M. Byers

According to current reports, the General Tire & Rubber Co. of Akron, Ohio, is negotiating to acquire the A. M. Byers Co., Pittsburgh, Penna., a leading wrought iron pipe producer. The Byers company is now in the midst of a battle with insurgent stockholders for control. It is believed that General Tire is attempting to gain control of the company in a move to expand its plastic-making activity through Byers' sales force and equipment. In January, 1955, the present Byers management gave up a plan to merge with Erie Forge & Steel Co. which had been attempted as a means of thwarting the attempts of an opposition group that has been trying to gain control of the company since 1953. Sidney Newman of New York, who heads the Byers opposition group, said he would oppose a merger with General Tire unless it provided for a benefit to Byers shareholders of at least $57 a share. This amount is equal to the book value per share of Byers common, he said, although he maintained the book value figure should be even higher than that. If negotiations with General Tire are satisfactorily concluded, the purchase plan would have to be submitted to Byers stockholders for a vote. This could pose a serious problem for the present management if the opposition group fights the proposal, since it claims to control a majority of the firm's 306,912 shares of outstanding voting preferred and common stock.

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### Appointments at Food Machinery

Dr. Charles A. Heiberger has been transferred to the Central Research Laboratory and has been appointed to the position of manager, Plastics and Polymers Department of the Central Research Laboratory, Chemical Divisions, Food Machinery & Chemical Corp., Nitro, West Va. Dr. Heiberger graduated from Lehigh University in 1935 with a B.S. degree in chemical engineering followed by an M.S.Ch.E. in 1937, and a Ph.D. in organic chemistry in 1939. He was an assistant instructor at Lehigh University from September, 1935 to June, 1939, and was then employed as a group leader by the U. S. Rubber Co. in their General Laboratories from July, 1939 to November, 1945, at which time he joined the Ohio-Apex Division to become its research director. Mr. Paul E. Willard who has been Assistant Director of Research of the Ohio-Apex Division since April, 1951 has been appointed to the position of director of research. Mr. Willard graduated from the University of Chicago in 1941 with a B.S. degree in organic chemistry and was a research and development chemist with the U. S. Rubber Co. General Laboratories until 1944 and with the Plastics Division of the Celanese Corporation until February, 1947 when he joined the Ohio-Apex Division. Both appointments were effective as of December 1.

### 1955 Motor Truck Facts

Automobile Manufacturers Association, New Center Building, Detroit, Mich., has announced publication of the 1955 edition of "Motor Truck Facts," companion to "Automobile Facts and Figures." This new edition of "Motor Truck Facts" contains some 50 pages of charts and tables, covering commercial vehicle factory sales and production, mileage, commodities shipped by truck, taxes, employment and other pertinent subjects. A table on truck registration from 1904 to date shows that the number of trucks in the nation will exceed 10,000,000 this year for the first time in history—twice the 1945 total. Nearly half the world's trucks are in the U. S., and more than 2,500,000 trucks are on U. S. farms.

"Now that you have joined our organization, Jones, there's a little formality we have with all our new employees!"

### To Head New York Office

The New York area office of the Hobbs Manufacturing Co. has been moved to 821 Eighteenth Ave., Irvington, N. J. Sales and service on all Hobbs products in this area will be under the direction of George E. Mansfield. Besides the complete line of Hobbs converting machinery for the rubber, paper, plastics, leather, wire and textile industries, he will supervise the installation of Hobbs Engineered Winding and Engineered Cutting programs. As a manufacturers' agent, Mr. Mansfield has been active in the converting field since 1940, specializing in sales of tension controlling, web guiding, and similar web handling equipment. With him is associated Robert P. Simoncini, who has been a member of the Hobbs staff for the past decade. Service is handled by John E. Kackle, who brings to the assignment practical factory training and extensive mechanical and electrical experience. Converters are offered information and assistance through the facilities of the Hobbs New York area office without obligation. Complete data on all Hobbs products, including the well-known Hobbs-Alquist constant tension winders and Hobbs-Jacques shears, are available on request from both the new Irvington, N. J., office and the Hobbs home office at 331 Salisbury St., Worcester, Mass.

### Ontario Holds Xmas Party

Approximately 105 members and guests of the Ontario Rubber Section of the Chemical Institute of Canada attended the Annual Christmas Party held on December 13 at the Collins Hotel in Dundas, Ont., Canada. The R. T. Vanderbilt Co., New York, N. Y., served as host at a cocktail party which preceded the serving of a dinner. Several door prizes were awarded to lucky ticket holders. The technical portion of the meeting was addressed by H. F. Bethel (R. T. Vanderbilt), who spoke on recent developments in the rubber industry, particularly those events leading to greater competition in the sale of synthetic rubber in the United States. Mr. Bethel observed that there is a strong possibility that Butyl rubber will find increasing use in the manufacture of tires. Following Mr. Bethel's address, George Winspear, editor of the *Vanderbilt News,* gave a humorous presentation of highly improbable copy for the publication.

### Quality Control Short Course

The ninth annual short course in "Quality Control By Statistical Methods" will be offered by the College of Engineering, University of Illinois, with the cooperation of the Division of Engineering Extension at Urbana, Ill., from May 19 through May 29, 1956. Intensive work will be given in the fields of control charts and acceptance sampling with some attention paid to the rational setting of specifications and tolerances. It is designed for those in the areas of design, production, procurement, management, quality control and inspection. For further information, write to: Professor John A. Henry, Mechanical Engineering Laboratory, University of Illinois, Urbana, Illinois.

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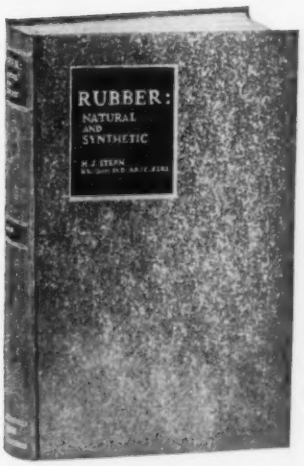


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# RUBBER:

## Natural and Synthetic

By H. J. STERN

B.Sc., Ph.D., A.R.I.C., F.I.R.I.

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(Orders for all other countries should be sent with remittance of 75s. 0d. to the publisher: MACLAREN & SONS, LTD., Stafford House, Norfolk Street, London, W.C.2, England).

### *About the Book–*

This book fills the need for an English-language text book on all phases of rubber and rubber products manufacture. As indicated by the chapter heads, the book is of interest to rubber manufacturers, suppliers of chemicals and machinery, rubber technologists and to students of rubber who will find present-day technical procedures clearly defined.

Part I covers natural rubber production, composition, properties and vulcanization as well as compounding ingredients, machinery, reclaiming and latex. Part II covers the development, manufacture and uses of synthetic rubber and latices, synthetic resins and plastics. In addition the manufacture of various rubber products are fully covered, including soles and heels, extruded goods, bonding, hollow goods, sponge and expanded rubber, belting, hose, tires, tubes and hard rubber.

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### *About the Author—*

Dr. Stern has been engaged as a chemist in the rubber industry for more than 25 years and since 1935 has practiced successfully in London as a Consultant. He is the author of "Practical Latex Work" and of many publications concerned with the scientific and technological aspects of natural and synthetic rubber.

**SUMMARY OF CONTENTS BY CHAPTERS**

**Part I**

1. **Historical Introduction; Mastication; Vulcanization.**
2. **Plantation Rubber.**
3. **Natural Rubber: Composition, Reactions, Derivatives.**
4. **Properties of Vulcanized Rubber.**
5. **Compounding Ingredients.**
6. **Rubber Machinery; Solvents and Solutions; Reclaiming.**
7. **Latex.**

**Part II**

8. **Synthetic Rubber (History and Development).**
9. **Manufacture and Technology of Synthetic Rubbers.**
10. **Synthetic Rubber Latices.**
11. **Synthetic Resins; Plastics.**
12. **Manufacturing Processes (of various rubber products).**
13. **Testing and Analysis.**

**Sources of Further Information; Metric Equivalents; Subject Index.**

### New Polymerizable Dispersant

A new and unique raw material for use with vinyl plastisols, known as "Monomer MG-1," has been introduced by the Carbide and Carbon Chemicals Co., New York, N. Y. Monomer MG-1 is unique because it acts as an efficient dispersant for vinyl chloride dispersion-type resins, but polymerizes during fusion of the resin to a hard resinous material which retains no plasticizing action. MG-1 thereby makes possible the production of vinyl plastics with any degree of hardness by plastisol techniques. In addition, Monomer MG-1 may be used in the preparation of useful new polymers and copolymers. MG-1 is a non-volatile, low viscosity, difunctional ester that polymerizes through the vinyl route. Polymerized MG-1 remains compatible with fused vinyl chloride resin systems containing conventional plasticizer. Fluid plastisols with low initial viscosity and good viscosity stability can be prepared with MG-1 alone or in combination with conventional plasticizers. Monomer MG-1 will also be used for the production of new polymers and copolymers. It can be copolymerized with styrene, vinyl chloride, vinyl acetate, acrylates, and other monomers. It should also be investigated as an impregnant for paper, leather, and similar materials since it can be polymerized in place. Formulators may also wish to investigate the potential use of MG-1 in calendering, extrusion, and other hot-processing techniques.

### Boston Sponsoring New Course

The Boston Rubber Group, in cooperation with Northeastern University, has announced a new course in Advanced Rubber Technology to be given at Northeastern University, Boston, Mass. The course will extend for sixteen weeks, on Wednesday evenings, beginning February 1. A fee of $40 per student has been set. The lectures will be given by Dr. B.B.S.T. Boonstra of Godfrey L. Cabot, Inc. The Education Committee of the Boston Rubber Group has voted that a bachelor's degree in chemistry or chemical engineering, or its equivalent in technical training and experience, will be a prerequisite for those wishing to take this course. Further information may be obtained from Alan W. Bryant, Education Committee, Boston Rubber Group, c/o Columbian Carbon Co., 803 B Park Square Building, Boston 16, Mass.

### Expanding Synthetic Output

Phillips Chemical Co. will further expand the capacities of its Plains synthetic rubber facilities near Borger, Texas, according to a recent announcement. Synthetic rubber capacity will be increased by 30,000 long tons annually, and annual capacity of the adjacent butadiene plant will be raised by 24,000 short tons. This expansion is in addition to previously announced projects. Increased customer demand for "Philprene" synthetic rubber is the reason for this new construction, Phillips states. The company makes and sells to rubber fabricators more than 20 different types of synthetic rubber materials bearing its Philprene trademark.

### Giant Earthmover Tire

Weighing around 2,000 pounds and selling for more than $5,000 the huge tubeless tire shown below is one manufactured by the Goodyear Tire & Rubber Co., Akron, Ohio, for gigantic earthmoving vehicles. The model is shown contrasting the big tire with the company's smallest tubeless tire for industrial use. The small tire weighs only three pounds and sells

for about $6. Goodyear developed both of these tubeless units, said to be the first in the industry, and has announced a complete line of tubeless tires for trucks and earthmovers. The size of the earthmover in the photograph is 33.5-33, 38-ply rating. Known as the "Sure-Grip Lug", it is constructed with all-nylon cord and is designed for Goodyear's new tubeless wide-base earthmover rim.

### Develops New Type Red Pigment

The Pigment Color Division, Imperial Paper and Color Corp., Glens Falls, N. Y., has announced the development of a new type red pigment called "Mercadium." These new Mercadium reds, a trade name intended to indicate a combination of the sulfides of cadmium and mercury, are somewhat more economical than the cadmium sufo-selenide reds they will replace, it is said. They offer equal performance along with improved brilliancy and cleanliness of hue. The company states that the raw materials are abundantly available, and increased production capacity is being provided. Since processing of these pigments involves a calcination at elevated temperatures, and since the chemical compounds are completely inorganic, Mercadium reds, according to the company, are insoluble in the processing media of industry, heat resistant at elevated temperature and extremely fast to alkali and the deteriorating effects of exposure to sunlight and the elements. Imperial is now producing a light and a dark Mercadium red, and is planning intermediate and maroon shades to a total of six in all. Usage of these new chemical pigment colors is expected to find use in the fields of rubber, plastics, latex and emulsion paints, automotive finishes and printing inks.

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### Elastex 20-A Plasticizer

Barrett Division, Allied Chemical & Dye Corp., New York, N. Y., has announced volume production of a new low-temperature plasticizer for vinyl products, called "Elastex 20-A Plasticizer". This new product (diisodecyladipate), not only gives vinyl formulations excellent performance at low temperature, but also provides relatively low volatility and good resistance to heat degradation, the company states. While the new 20-A plasticizer provides stocks with a low-temperature performance and a plasticizing efficiency nearly equal to that of dioctyl adipate, it gives formulations having less than half the volatility. Furthermore, 20-A plasticizer is of such low color that it may be used in the manufacture of transparent vinyl products, company officials point out.

Elastex 20-A Plasticizer is furnished with an added concentration of antioxidant that is considered suitable for most service requirements. However, the proportion of additive may be adjusted or eliminated completely at the user's request. Barrett has available samples of this new ester of adipic acid, as well as technical data outlining its specific properties and end use suggestions.

### Named Sales Office Manager

Davis-Standard Sales Corp. of Mystic, Conn. has announced the appointment of Mr. Joseph T. Marie as sales office manager. Mr. Marie has been with Davis-Standard since February, 1953, and his first assignment was that of assistant purchasing agent. This was followed by service in the Cost Department and then in the Sales Department as cost sales co-ordinator. Prior to joining Davis-Standard Sales Organization, Mr. Marie had been employed by the Pullman-Standard Car Corp. as a time study man. Other companies with which Mr. Marie has been associated include the American Velvet Co. and the Atwood Division of Universal Winding Co. in Providence, R. I. Mr. Marie's newly assigned duties will include responsibility for the coordination of all sales activities of the Davis-Standard Sales Corp. which is the sole selling agent for the Standard Machinery Co. They handle a complete line of wire machinery and high quality extruders for rubber and plastics, including the exclusive "Therma-Fin" extruder.

### Appointments at Carwin Co.

Carwin Co., North Haven, Conn., has announced the appointment of Dr. Louis J. Owen to its Sales Department. Dr. Owen will aid in the market development of the company's diisocyanates and other new products. He formerly headed the Process Development Group. The company has also announced the appointment of Dr. Robert V. Smith as supervisor of organic chemical research and development. Dr. Smith was formerly in charge of the Research Group. Also announced by Carwin was the appointment of Dr. Robert B. Holden as supervisor of research in physical chemistry. Dr. Holden comes to Carwin from Sylvania Electric Products, Inc.

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### Sawyer-Tower Formed by Merger

H. M. Sawyer & Son Co. of Cambridge and Watertown, Mass., has been merged with the A. J. Tower Co. of Boston, Mass., and the J. F. Carter Co. of Beverly, Mass., according to a recent announcement by Charles L. Foote, president of the Sawyer company. The new organization, to be known as Sawyer-Tower, Inc., combines three firms each more than one hundred and fifteen years old. All have been active in the manufacture of rainwear and protective clothing. Mr. Foote will be president of the new company. Each company will operate as an independent division of the parent organization. The older of the three companies, the A. J. Tower Co., was founded in Boston in 1836. They were pioneers in the development of the oiled waterproof clothing known as slickers. The Tower concern, with its A. J. Carter Division today manufactures a broad line of waterproof clothing treated with industrial oils as well as natural and synthetic rubber solutions and materials. Long a producer of rainwear, the 115-year old Sawyer firm has, in addition, specialized in protective and safety clothing since 1948. It is expected that the merger will increase efficiency in research, development, production, marketing and distribution.

### New Polyethylene Resin

A new polyethylene resin that produces unbreakable molded articles with greater rigidity, more wear-resistant surfaces, and higher gloss has been announced by the Bakelite Co., New York, N. Y. The new resin, "Bakelite Polyethylene DXM-103", is expected to provide added sales appeal for a wide variety of consumer products, particularly housewares and toys. The added rigidity is especially significant in the production of larger size moldings. Both rigidity and higher gloss of such articles are readily apparent to the consumer. The high gloss of the new material is created by the resin's excellent flow characteristics in the mold. The easy flow also eliminates flow lines characteristic of ordinary polyethylene molding materials. In the packaging field, the new material is expected to make possible the production of caps and closures with greater resistance to staining by chemical contents such as cosmetics, foods, oils, acids, and caustics. DXM-103 is a more dense material than standard polyethylene resins. It has improved tensile strength, increased surface hardness, improved resistance to staining, and slightly reduced permeability, the company states.

### Buys Esmond Chemical Co.

Tennessee Corp. has announced that its subsidiary, Tennessee Copper Co., has purchased the sodium hydrosulfite, sulfoxalate and zinc oxide manufacturing facilities of the Esmond Chemical Co. of Esmond, R. I. The corporation plans to move this equipment to Copperhill, Tenn., where the subsidiary operates its mines and several chemical plants to provide a source of these chemicals close to consuming areas. Major industries to be served from this plant include rubber, textile, clay, rayon and processing industries.

### Transferred to New York

John H. Drexler III, special representative for the Chemical Division of the Goodyear Tire and Rubber Co., has been transferred from the Cleveland, Ohio, territory to the firm's New York office. Mr. Drexler has provided sales and service to the Cleveland territory since May, 1954, specializing in "Plio-Tuf" thermoplastic high impact resins and "Pliovic" vinyl resins. In his new assignment in New York, he will handle, in addition to these products, "Chemigum" and "Pliolflex" rubbers. Prior to joining Goodyear, Mr. Drexler had 14 years of chemical sales experience, with interruptions for military service during World War II and the Korean conflict. He also has been commanding officer of Naval Air Reserve Transport Squadron 651 at the U. S. Naval Air Station at Akron for the past several months. He is a graduate of Rutgers University with a bachelor of science degree in chemistry and is a member of the American Chemical Society and Society of Plastic Engineers.

### Tubeless Hi-Miler Rib Tire

A new tubeless truck tire in the low price field, has been announced by the Goodyear Tire & Rubber Co., Akron, Ohio. Known as the "Tubeless Hi-Miler Rib", this tire incorporates all features of the company's long-established tube-type Hi-Miler Rib, plus the greater blowout and puncture protection inherent in Goodyear's tubeless construction, the company said. The new tire is the first tubeless unit ever offered at this lower price, it was stated. This tire is available in four sizes (6.00-16, 6.50-16, 7.00-15 and 7.00-16), all six-ply rating. This new tubeless is designed for trucks with 15 and 16-inch wheels, and will fit present full drop center rims. The tire is built with what the company terms its "Grip Seal" construction. Cord of this tire is also triple-tempered by the company's exclusive (3-T) process. The tire also is cooler running, can usually be repaired on the wheel, and achieves a weight savings over conditional tires, Goodyear stated.

### Guide Grip Tractor Tires

Development of a new farm tire for the front wheels of tractors that will give up to 60% longer wear than any other front tractor tire has been announced by the Firestone Tire & Rubber Co., Akron, Ohio. The new Firestone "Guide Grip" tire has undergone extensive field and road tests and now is available through Firestone dealers and stores. In addition to being the longest-wearing front tractor tire ever built, the company states that the tire has additional advantages which feature: (1) Better steering and shorter turning than conventional tires, (2) Better cleaning in all types of soil conditions, (3) A built-in mud guard, or deflector strip, which protects the sidewall and beads, and (4) Greater resistance to impact breaks provided by the Firestone safety-tensioned, gum-dipped cord body. A mud guard, or deflector strip, was the answer of Firestone engineers to the problem of earth, stubble and other field debris injuring the tire bead and sidewall. Extending above the rim flange, the mud guard deflects mud, earth and stubble. In exhaustive tests in laboratories and on the Firestone Homestead Farms in Columbiana, Ohio, the new tire has proved superior to other front wheel tires under all operating conditions, company officials claim.

### Beebe Rubber Expanding

E. Coleman Beebe, president and treasurer of the Beebe Rubber Co., Nashua, N. H., has announced construction of an addition to the local plant which will be used for storing finished products, goods already in production, and raw materials. The addition, which will contain 6,000 square feet of floor space, will be completed within the next few weeks. The need for greater space came as a result of Beebe Rubber taking exclusive rights for the manufacture of "Ripple Soles" for "Ripple Sole" shoes. The new space is in addition to an 8,700 square foot building constructed last year. The new building will have a temporary wall to make way for further projected expansion in the future, company officials stated.

### Thixon IB-2 Bonding Adhesive

Harwick Standard Chemical Co., Akron, Ohio, is now marketing "Thixon IB-2", a rubber-to-metal bonding adhesive manufactured by Dayton Chemical Products Laboratories, Inc., West Alexandria, Ohio. The product is suggested for problems involving vulcanization bonding of Butyl compounds to brass plate and primed metals. Thixon IB-2 is a special compound of rubber and chemical derivatives in volatile solvent. Black in color, it is non-toxic in ordinary handling. Supplied in brushing consistency, it has a specific gravity of 0.82 and weighs 6.83 pounds per gallon. Thixon IB-2 was formerly known as D-314 cement.

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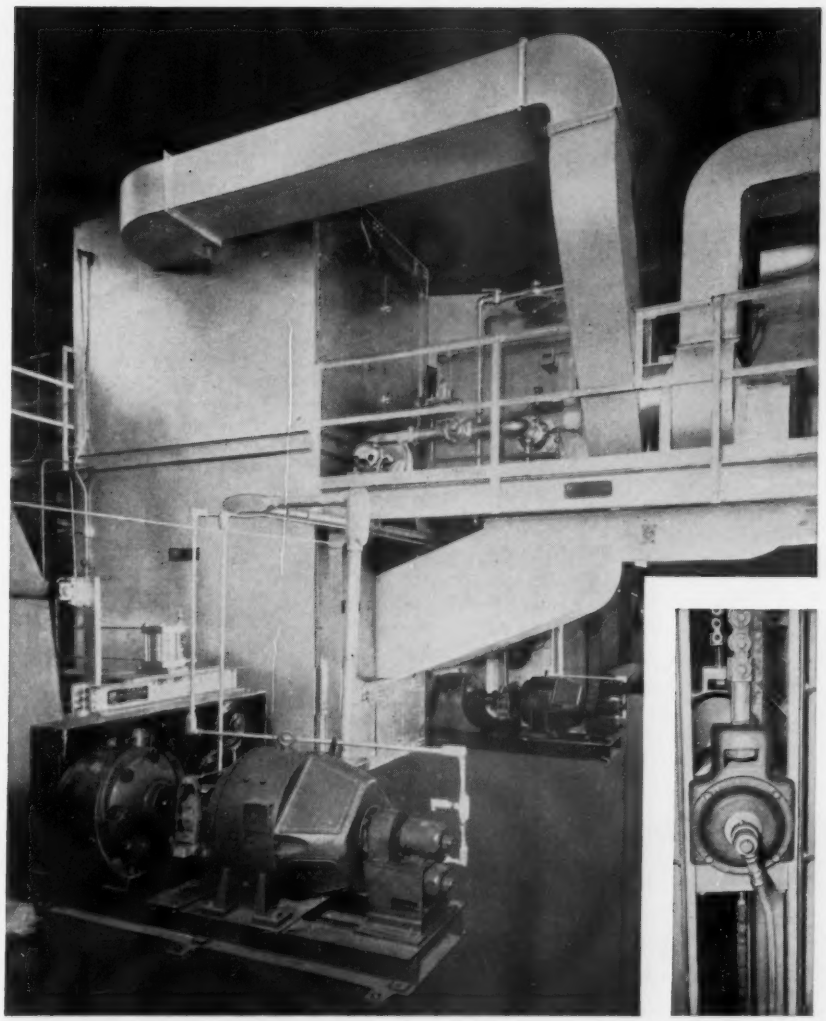

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# West Coast News

At the annual election of the Los Angeles Rubber Group, the following members were elected to office for 1956: *Chairman,* Carl S. Hoglund (R. D. Abbott); *Associate Chairman,* R. N. Phelan (Atlas Sponge Rubber); *Vice-Chairman,* A. H Federico (C. P. Hall); *Treasurer,* B. R. Snyder (R. T. Vanderbilt); *Assistant Treasurer,* Walter Boswell (Thiokol); *Secretary,* W. M. Anderson (Gross Mfg.); *Assistant Secretary,* Leighton Taylor (Mask-Off).

The following members have been elected as directors of the Los Angeles Rubber Group: F. C. Johnston (Caram Mfg.), John Arensmeyer (Ratliff Rubber), Dan E. Budnick (Kirkhill Rubber), and Neil Pestal (Firestone).

The following members have been named chairmen of the committees noted for the 1956 season: *Educational,* R. E. Bitter (Goodrich Chemical); *Publicity,* Richard Thomas (Goodyear); *Reception,* Robert Hatch (Voit Rubber); *Yearbook,* Harold Sears (Stillman Rubber); *Placement,* C. E. Wilson (Pacific Moulded Products); *Golf,* Charles Findlay (Shell Chemical); *Technical,* Robert Coleman (Sierra Rubber Products); *Prize,* M. A. MacDonald (Midwest Rubber Reclaiming); *Audit,* Charles Sickles (Master Processing); *Membership,* W. L. Chaffee (Ohio Rubber), and *Current Events,* H. H. Thompson (Firestone).

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Griffith Rubber Mills has completed the first $100,000 phase of its expansion program at its Portland, Ore., plant. This involved new equipment for molding and extruding rubber goods, much of it installed in an adjacent structure acquired in 1954. The addition doubles molding capacity and increases capacity for the production of extruded rubber goods.

The new facilities make it possible for the company to handle the largest rubber rolls used by the paper industry. By moving presses and extruders to the new building, additional room was added to the Rubber Roll Department.

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B. E. Dougherty Co., with offices in both Los Angeles and San Franciso, has been appointed western representative for Darlington Chemicals, Inc., Philadelphia, Penna., suppliers of magnesium oxide, magnesium carbonate and magnesium hydroxide.

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### C. K. Williams Personnel Changes

L. K. Ayers, president of C. K. Williams & Co., Easton, Penna., has announced several organizational changes to become effective immediately. E. H. Green has been appointed to the newly-created position of executive vice-president. He will also serve as chairman of the Executive Committee. Mr. Green's former post of general sales manager will be filled by E. H. Kroepel, presently Eastern Division sales manager. S. E. Richards will take over the position of Eastern sales manager. T. J. Stewart has been promoted from works manager at East St. Louis, Ill., to general production manager of all company plants. The new works manager at East St. Louis is A. T. Pickens. The board of directors of the company has named the following to serve on the Executive Committee: E. H. Green, J. W. Ayers, L. K. Ayers, W. N. Crumpler, R. W. Dodson, E. H. Kroepel, J. W. Schlosser, R. A. Stephens, T. J. Stewart, and M. R. Williams.

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### Johnson Named Sales Manager

George C. Johnson, associated with the Hamilton Rubber Manufacturing Corp., Trenton, N. J., since 1950, has been named sales manager of the company. For the past five years, Mr. Johnson has served as promotional sales manager. Mr. Johnson entered the rubber goods industry in 1919 in the Chicago branch of a well-known industrial rubber goods manufacturer. He was appointed manager of that branch and eventually moved to the home office as general sales manager.

### Acquires Interest in Seiberling

Edward Lamb, publisher and broadcaster, has acquired a major stock interest in the Seiberling Rubber Co. of Akron, Ohio. Mr. Lamb is publisher of the Erie (Penna.) *Dispatch* and owner of radio and television stations in Ohio, Pennsylvania and Florida. He is also chairman of the board of Air-Way Industries, Inc., which makes vacuum cleaners. Frank C. Oswald, vice-president of Edward Lamb Enterprises, Inc., reported that "Edward Lamb, his controlled companies and friends have acquired 100,000 shares of stock" of Seiberling. There are 392,000 shares outstanding. "Mr. Lamb acquired the stock of Seiberling for investment," Mr. Oswald added. "We believe that Seiberling is a growth situation which affords a great opportunity for further expansion and development." Mr. Oswald would not comment as to whether the purchase indicates an attempt by the Lamb group to obtain control of Seiberling or whether it will seek representation on the Seiberling board. The company holds its next annual meeting on April 23.

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### Bassons Industries Expanding

Bassons Industries Corp., New York, N. Y., has announced the purchase of 100,000 square feet of the former plant of the Alexander Smith Carpet Co. in Yonkers, N. Y. The new facilities will more than double present output, according to company officials. Operations at the company's plant at 1432 West Farms Road, New York 60, N. Y., will be continued in addition to the new facilities.

### Power Express Truck Tire

A new "Power Express" tubeless truck tire with a special "X-99" tread compound has been announced by the B. F. Goodrich Company Tire & Equipment Division, Akron, Ohio. Available for both original equipment and replacement use, the new tire is built to meet tubeless tire and rim assembly measurement requirements as standardized by the Tire & Rim Association. An "armor coat" of the new X-99 tread compound covers the tread of the Power Express. This compound helps prevent tread cracking and checking and thus improves tire life. The durable compound remains in the tread contour between the ribs to provide full protection during the life of the tread. "The new Power Express tubeless, when mounted on a new drop center rim assembly, means an overall weight reduction of approximately 49 pounds per wheel on some popular sizes," according to J. E. Powers, manager of truck tire sales for Goodrich. "This would allow a truck operator about 400 pounds more legal payload on a 10-wheel rig".

Because heat generated by the tubeless tire is less than heat generated by the conventional tire and tube of equivalent carrying capacity, the Power Express tubeless runs cooler. A double layer of tough Hycar 2202, a special polymer designed to insure maximum air retention, lines the inside of the Power Express. Notched ribs in the tread increase tread gripping action, improving traction on all types of roads. Power Express tubeless truck tires will be available to cover the load capacity ranges of tire sizes previously covered by conventional truck tires in sizes 6.00-16 6-ply, through 11.00-24 12-ply. The overall dimensions of the new tires will be the same as the conventional truck tires they replace.

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### Cites Need For Expansion

W. S. Richardson, president of the B. F. Goodrich Co., addressing a recent meeting of the Boston Conference on Distribution, said that the world will need to expand its facilities for producing man-made rubbers by a half million tons within the next five years, principally in the United States. Mr. Richardson said that short supplies of crude rubber are being made up by increased production of man-made rubbers. He estimated that world consumption of all kinds of rubber will be 2,800,000 tons this year and will exceed 3,000,000 long tons by 1960. He stated that "total production of crude rubber last year was about 1,800,000 long tons and we look for the world crude rubber supply for the next five years to exceed only slightly that figure on a year-to-year basis." The rubber company executive said that the United States has facilities capable of producing more than 1,000,000 long tons of man-made rubber. Without these facilities the world would be short about 1,000,000 long tons this year and the price for tree rubber would be stated in dollars rather than cents per pound.

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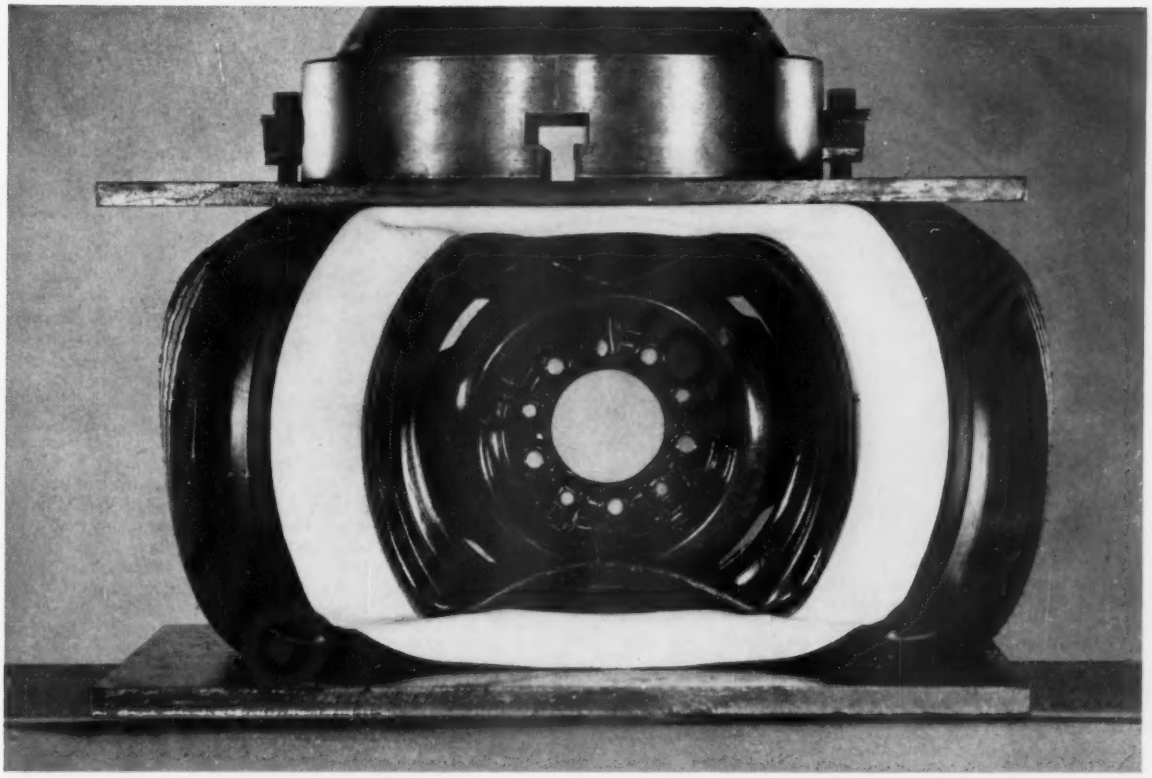

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# Canadian News

Polymer Corp., Sarnia, Ont., is actively exploring the possibility of building a butadiene plant, using butane as a raw material. Location of the new plant might be in Alberta, Sarnia, Ont., or any place where there may be a large volume of butane available. An important consideration in location of new plant will be the building of the proposed trans-Canada gas pipeline from Alberta to Eastern Canada. Such a pipeline would mean that a much larger volume of light hydrocarbons, particularly butane, would become available in Alberta. Ultimate decision regarding eventual location of a butadiene plant, based on butane, will be governed by many economic factors.

Polymer has been expanding rubber output steadily during the last several years and has now outrun its butadiene supplies. During 1955, substantial quantities have had to be imported from the United States. To the present raw materials for manufacture of butadiene have been obtained from adjacent oil refineries.

Butylene, extracted from the refinery stream has been converted into butadiene, one of the two principal ingredients used in the manufacture of general purpose type rubber. Careful survey indicates that large new sources of butylene, necessary to support increasing rubber production, are not available. It would appear that the most promising raw material for this purpose is butane.

Initial quantity of butane required for butadiene manufacture is estimated at some 600,000 barrels per year. This amount is believed to constitute a substantial portion of the available butane from natural gas in Alberta.

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Some 1,500 chemists and chemical engineers from across Canada, are expected to attend the 1956 conference of The Chemical Institute of Canada in Montreal next May, T. H. C. Raikes, conference chairman, announced recently. The conference will be held in the Sheraton-Mt. Royal Hotel on May 28, 29 and 30. The three-day event will feature papers by leading scientists from Canada and the United States, who will discuss many technical problems faced by chemists today and will give a glimpse into the future of the chemical industry. At the 60-booth exhibition which will be held in conjunction with the conference, a number of new chemical developments will be unveiled for the first time. New laboratory supplies and equipment will also be on display.

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The 10th Divisional Conference of the Protective Coatings Division, The Chemical Institute of Canada, will be held in Toronto, February 23, 1956, at the Royal York Hotel, and in Montreal, February 24, 1956, at the Ritz Carlton Hotel. This continues the two-city meetings that this Division successfully inaugurated in 1953. The same program is scheduled for both cities.

The speakers will include: F. K. Daniel, Daniel Products Co., New York, "The Influence of Solvents on Pigment Dispersion and Seeding"; B. M. Baker, Canadian Industries Ltd., "Some Applications of Colorimetry"; R. P. A. Sims, Department of Agriculture, Ottawa, "Polymerization of Vegetable Oils"; W. D. McMaster, Research Laboratories, General Motors, Detroit, "Durability of Films"; and J. V. Lang, The W. C. Hardesty Co., "Fatty Acids". A luncheon will also be included in the day's program with a guest speaker.

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A contract for a new $3,500,000 chemical plant to be built by B. F. Goodrich of Canada, Ltd., near Niagara Falls, Ont., next spring has been awarded to Arthur McKee & Co. of Canada, Ltd., according to M. G. Morgan, Goodrich vice-president, manufacturing. The new plant, scheduled for completion early in 1957, will produce Geon polyvinyl materials.

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Vincent P. Reid, executive vice-president of the General Tire & Rubber Co. of Canada, Ltd., has announced the appointment of T. C. Sutton to the position of assistant treasurer.

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Wooster Rubber Co., Wooster, Ohio, is carrying out a $500,000 expansion program at its Canadian subsidiary in Port Credit, Ont. Wooster's investment in its wholly-owned Canadian subsidiary amounted to $92,470 at September 30, 1955, compared to $73,204 at the end of the previous fiscal year.

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According to R. C. Berkinshaw, president of the Goodyear Tire & Rubber Co. of Canada, Ltd., the volume of rubber industry business in 1956 should be slightly better than it was in 1955. The indications are, he stated, that 1956 will be a year of further expansion, both in the construction and industrial field. The automotive industry, he pointed out, is looking forward to a continued high level of production to satisfy consumer demands.

It would appear, he said, that there will be continued upward pressure on prices. The indications are that present world market prices for rubber will be maintained and may even rise to higher levels. Higher costs would indicate that prices of manufactured goods, including rubber products, may be slightly higher in 1956 than they were in 1955. Employment should be maintained at current levels.

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The performance and properties of "Plastole in 9404 TGP" are described in a new booklet available from Emery Industries, Inc., Carew Tower, Cincinnati 2, Ohio.

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Automobile safety belt kits, designed for easy installation by the auto owner, are being test marketed in a number of areas throughout the country by the B. F. Goodrich Co. Tire and Equipment Division.

### Patent Examiner Posts

According to the New York Patent Law Association, American industry is facing long delays in obtaining patent coverage for products and processes otherwise ready for the market. These delays stem from the great increase in the number of patent applications filed during the past few years. This flood of inventions has stretched the average prosecution time per patent to three and a half years.

The Association points out that the Patent Examiner holds a key position in the advancement of American technology and that the only way to reduce these delays and clear the way for marketing the new products and processes is to employ new Patent Examiners to pass upon the backlog of applications which is piling up in almost every technical field. Steps have already been taken in this direction and over 100 new Patent Examiners have been added to the examining staff since June of 1955, and it is understood that the Patent Office plans to build this number up to a total of 350 new Examiners by the end of 1956.

There are immediate openings for engineers and scientists who can accept appointments as Patent Examiners, and the Association points out that technical graduates who apply will find the job interesting and challenging and one in which they are kept in close touch with the latest technical developments. The job also offers opportunities for advancement within the Patent Office. The salaries for Examiners start at $4,345 a year, and it is possible to reach a salary of $7,570 in five and one half years. The Patent Office also offers liberal vacations and sick leave and pension benefits. Engineers and scientists holding a college degree in engineering or applied science, or a degree with a major in chemistry or physics, or with certain combined credits in these fields, are eligible for appointment as Patent Examiners, without examination, upon application to the Commissioner of Patents in Washington.

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### Announce New Type of Latex

Latex and Rubber, Inc., Baltimore, Md., has announced the bulk importation of a new type latex. The latex, called "Soctex Type 'CD' Centrifuged Latex," is a low ammonia latex with an ammonia content, based on total wet weight, of approximately 0.15%. The latex according to the company is suitable for use in foam rubber manufacturing and in adhesive applications because of its low ammonia content. The material has a total solids concentration of 62% minimum and a dry rubber content of 60% minimum. The milky white latex with no pronounced blue or gray color has a surface tension of 30 dynes/cm minimum and a coagulum content of total solids of 0.06% maximum. Copper content of total solids amounted to 0.001% maximum and manganese content of total solids amounted to 0.0005% maximum. Tests on this material were conducted according to ASTM methods.

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# Obituaries

### *Edward D. Youmans*

Edward D. Youmans, vice-president in charge of research and product development for the Okonite Co., Passaic, N. J., died of a heart attack on December 18 at his home in Upper Montclair, N. J. He was 58 years old. Mr. Youmans joined Okonite in 1913 as a laboratory assistant. He was named technical manager in 1928; vice-president and technical director in 1943, and vice-president in charge of manu-

facturing and research in 1951. He was elected a director in 1952.

Born in Garnersville, N. Y., Mr. Youmans received his technical education at the Brooklyn Polytechnic Institute. Throughout his career, he was actively engaged in the development of insulated wires and cables, particularly in adapting synthetic rubbers and rubberlike materials to these products. He took active part in preparing standards for the National Electrical Manufacturers Association, the American Society for Testing Materials and the American Standards Association. He served as chairman of numerous committees of these organizations and with the National Electrical Code.

During World War II, Mr. Youmans worked with the Rubber Director's Office of WPB. He also worked with the U. S. Navy on the conservation of natural rubber and the development of synthetic rubber. He also served as technical advisor on wire and cable to the Copper Branch of WPB. Mr. Youmans wrote many articles for technical and trade journals and was a contributing author to the Encyclopedia of Chemical Technology. He was a member of the Division of Rubber Chemistry of the American Chemical Society, the International Association of Electrical Inspectors and was the immediate past-president of the Montclair (N. J.) Society of Engineers. He is survived by his wife, two daughters and a son.

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### *James E. Power*

James E. Power, former manager of national accounts and trade relations for the Mechanical Goods Division of the U. S. Rubber Co., New York, N. Y., died suddenly on December 17 in Ashville, N. C. Mr. Power had retired on October 31 after 49 years of service with the company. He was 65 years old. Mr. Power joined U. S. Rubber as an office boy in 1906, the day after his sixteenth birthday. He retired a few days after his sixty-fifth birthday after a continuous record of employment broken only by his service in the Navy during World War I. Mr. Power became manager of the New York branch for the Mechanical Goods Division in 1926. He served also as assistant manager of all branches for the division and eastern district sales manager before becoming manager of national accounts in 1949. He was a member of the Metropolitan Club, the New York Athletic Club and the Masonic order. He leaves his wife, a son and two daughters.

### *Robert S. Pope*

Robert S. Pope, personnel manager at the Los Angeles, Calif., plant of the Goodyear Tire & Rubber Co., died on December 20, following a four-month illness. A native of Fort Gibson, Okla., Mr. Pope joined Goodyear in 1919 as secretary to the chief engineer. In 1920, he was assigned secretary to the superintendent of the Los Angeles plant. Mr. Pope returned to Akron in 1928 as secretary to P. W. Litchfield. Mr. Pope returned to Los Angeles in 1930 as personnel manager. In 1934, he was named assistant to Mr. Litchfield, and in 1937 was named assistant personnel manager. He served as manager of personnel at the Goodyear Aircraft Corp. in Akron from 1938 until 1942, when he was made manager of personnel at the parent company. He served as director of personnel from 1942 to 1946, when he was assigned the post of personnel manager at the Los Angeles plant.

### *E. L. Schmock, Sr.*

E. L. Schmock, Sr., a former sales executive of several companies in the rubber industry, died on December 25 in Akron, Ohio. He was 68 years old. During his career, Mr. Schmock had been division sales manager for the old Miller Rubber Co. (now part of Goodrich), and later was general sales manager of the American Tire & Rubber Co. For six years, Mr. Schmock was in the Operating and Sales Departments of the Firestone Tire & Rubber Co. and was assistant to the sales manager. He also served as manufacturers' representative for the Scoville Manufacturing Co. of Waterbury, Conn. During World War II, he was senior industrial specialist with the War Production Board.

### *Kurt Maier*

Kurt Maier, editor of *Gummi Zeitung*, died on November 4, 1955, in Germany. Born on March 22, 1900 in Stuttgart, Mr. Maier studied in Berlin and Tubingen and in 1921 joined the staff of *Gummi Zeitung*. In 1929, he was named chief editor of the publication, a post which he held until 1935 when he entered into a commercial endeavor. In 1938, Mr. Maier joined the staff of Fromms Act Gummiwerke, G.m.b.H. He was named general manager of this organization in 1941 and held the post until 1945 when the firm disbanded. During the next few years he contributed to Gummi Zeitung, and in 1949 was appointed editor of the journal. He held this post until his death on November 4.

### *D. James MacGillis*

D. James MacGillis, treasurer and assistant secretary of the Heresite & Chemical Co., Manitowoc, Wisc., died on December 3 in Oak Park, Ill. He was 59 years old. Mr. MacGillis had joined Heresite in 1947 as sales manager. A World War I veteran and American Legion member, Mr. MacGillis is survived by four brothers and two sisters.

### *Marshall L. Hough*

Marshall Lewis Hough, president of the Darling Valve and Manufacturing Co., Williamsport, Penna., died on December 7. Mr. Hough joined the company in 1920 as a young man to learn all phases of the valve business. In June, 1939, he was elected president of the company, and he continued in that capacity until his death.

### *John S. Krauss*

John S. Krauss, retired manager of the L. H. Gilmer Co., a division of the U. S. Rubber Co. at Philadelphia, Penna., died on December 4 in Philadelphia. He was 77 years old. Mr. Krauss had been president of the L. H. Gilmer Co., before it was sold to U. S. Rubber.

### British Price-Fixing Charged

Thirteen international tire companies, two of them American, have been accused of reaching secret agreements to control tire prices in Britain. A Royal Monopolies Commission held that the trade practices of the tire manufacturers conference were "against public interest." The industry was urged to abolish fixing retail prices to allow "genuine price competition." Four members of the commission dissented from the majority report sent to Parliament. The report is in the form of recommendations. The two American-controlled companies mentioned were Goodyear and Firestone. Other foreign firms listed were North British, Domion, Michelin, Bergounan and Pirelli. Six manufacturers named in the report are British-controlled—Dunlop, India, Avon, Henley's British Tyre & Rubber, John Bull and Davies. While criticizing the pricing practices of the combine, the commission said "the industry's ban on the production of unbranded tires promotes safety and is not against the public interest."

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| Method of Speed Control | No. of Motors | HP Each Motor | Friction Ratio | Roll Speed (RPM) Front | Back |
|---|---|---|---|---|---|
| Constant | 1 (AC) | 7½ | 1.4:1 | 23.5 | 33 |
| Vari-pitch Pulley | 1 (AC) | 7½ | 1.4:1 | 13 to 24 | 18 to 34 |
| Vari-pitch Pulleys | 2 (AC) | 5 | Variable | 20 to 38 | 18 to 34 |
| Adjustable Voltage | 2 (DC) | 5 | Variable | 4.5 to 34 | 6 to 45 |

You can get an idea of the popularity of Farrel's two-roll, 6" x 13" lab mill from that *partial* list of users. A number of these big names in industry have sent in repeat orders for one or more additional mills.

One reason for this wide acceptance is that, in standard form, the mill comes with four different drive arrangements (see chart). One of these should give *you* exactly the roll speed or speeds, and friction ratio you need for experimental work.

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# New Goods

## Poron Vinyl Shoe Insole

United Shoe Machinery Corp., 140 Federal St., Boston, Mass., has introduced a new type of long-wearing shoe insole called "Poron". Made of Bakelite vinyl resins, the new sole is rich in pores for breathing and absorbing perspiration without cracking. United Shoe is said to have developed a unique method of processing the vinyl resins with a high degree of porosity. To

make these new insoles, a layer of the porous material is laminated between two layers of latex-impregnated backing. This sandwich is then split in half to form two insoles, for left and right shoes, as shown in the accompanying photograph. The porous layer is used uppermost for contact with the foot. The new insole is said to be 20 to 40 times more porous than ordinary insoles, according to the manufacturer, and gets rid of absorbed moisture many times faster.

## Herco Protective Aprons

Hecht Rubber Co., Inc., 14 East Bay St., Jacksonville, Fla., has introduced a new line of protective aprons especially designed to offer protection against greases, oils, acids, alkalies and other chemicals. Points of strain are reinforced for long wear. The aprons incorporate rust-proof, brass corner grommets and strong tiestrings. The aprons are available in three weights. A light-duty size measures 29 by 36 inches; a medium duty size measures 36 by 40 inches, and a heavy duty type is available in sizes 36 by 40 inches up to 36 by 48 inches.

## Allflex All-Purpose Hose

A new, advanced type of all-purpose hose has been announced by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J. Described as suitable for use with air, oil, water and mild chemicals, the new hose is being marketed under the trade name of "Allflex". Allflex is credited with having major advantages, including extremely long life and non-kinking. It is the newest addition to the R/M line of hose, and the first all-purpose hose of mandrel-made, horizontal braided construction, the company states.

## IPCO Neoprene Coverall

Industrial Products Co., Philadelphia 33, Penna., has announced a new one-piece coverall for the protection of personnel who are subject to the splash and spray of oils and acids. The base fabric of the coverall is a close woven cotton which has been neoprene coated on both sides. Fully vulcanized at all seams, the coverall has

a stand-up collar which is corduroy tipped. A full-length heavy duty zipper facilitates putting on or taking off the suit. The zipper fully closes the opening and in addition is protected by an overlapping fly front which securely fastens down with ball and socket snap fasteners. The inside of the sleeves are fitted with gum neoprene cuffs which fit close to the wrist. There is extra reinforcement on the bottom inside of the trouser legs to provide additional wear and acid resistance. The coverall is black in color.

## Hypalon Covered Belt

A new type of hot-materials elevator belt now being introduced commercially by the U. S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., features a cover of "Hypalon". Handling hot by-product salt in field trials at a large eastern chemical plant, the new belt is said to have demonstrated outstanding heat resistance by lasting twice as long as the best belting formerly available. The belt—57 feet long and equipped with 56 "Monel" metal buckets— lifts hot salt from a direct-fired rotary drier to storage bins 27 feet above. It operates intermittently, running about 50% of the time during a round-the-clock, seven-day work week. The belts previously used in this application lasted only two to three months. Failure came from embrittlement and cracking of the rubber adjacent to each bucket, especially around bolt holes drilled through the belt for attaching the buckets. When belts became stiff they broke, tying up the entire production unit. The new belt covered with Hypalon lasted more than six months. When failure finally did occur, it was as a result of embrittlement in the carcass.

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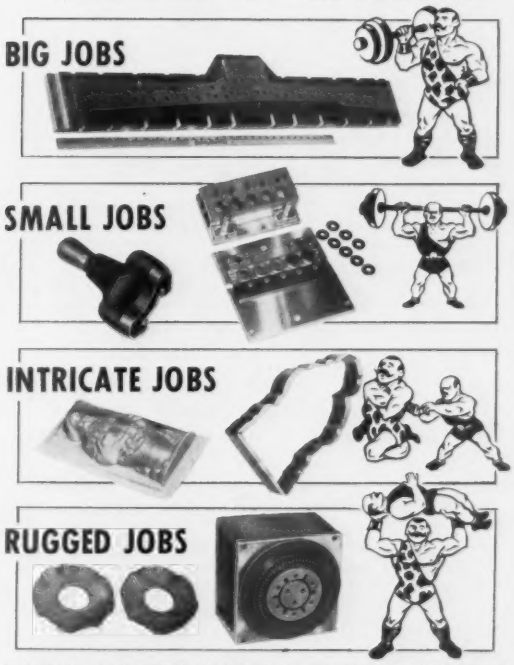


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| Unsaponifiable | 1.5% max. | |
| Saponification Value | 198 — 203 | 198 min. |
| Acid Value | 197 — 202 | 190 min. |
| % F.F.A. as Oleic Acid | 99 min. | |
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## Goodrich Aircraft Wing Tubes

Rubber tubes, manufactured by the B. F. Goodrich Co., Akron, Ohio, and applied to the leading edge of the wing of the F-84F jet fighter, have cut the distance needed to land the plane by one-third, according to the Air Research and Development Command. The inflatable leading edge was conceived by the Air Force and developed by Goodrich. The ARDC said the wing edge is covered with a tubular-like rubber surface which lies flat against the wing. When air is pumped into the tube, the leading edge is reshaped. The result is a comparatively simple means of controlling the flow of air over the aircraft wing. The smoother the flow of air over the wing, the slower the speed at which the aircraft can land. A slower speed, moreover, requires less runway room.

Modern high performance flight, however, demands thin wings with sharp leading edges which cause a turbulent flow of air rather than a smooth flow. As a result, planes must land at a higher speed. Two methods, leading edge slats and leading edge flaps are currently used. The new rubber method, however, costs less and should be more easily maintained because it has no mechanical parts, ARDC states. In addition, total weight of the inflatable rubber unit is about 50 pounds compared with 200 to 400 for leading edge slats and flaps. Experiments have shown that the inflatable leading edge on the F-84F will reduce landing speeds by about 23 miles and take-off speeds by about 17 miles an hour, or approximately 10%. This cuts the landing distance nearly one-third and take-off distance about one-fifth, ARDC said.

## Molded Rubberized Hair

Molded rubberized hair to be used as standard cushioning material to protect products while in transit or storage is now being marketed by the Curled Hair Division of Armour & Co., Alliance, Ohio. The product is described as having qualities which permit exact conformity to the shape of the product, maximum cushioning in a minimum package and cubage saving on warehouse space. Units are easily assembled, the manufacturer states, affording savings on labor-packing costs. Molded rubberized hair will also provide more efficient cushioning for heavier items, the company states. The molded pack is said to be shock resistant yet lightweight, dust free, moisture resistant and economical.

## Improved Ice Slinger Hose

Goodyear Tire & Rubber Co., Akron, Ohio, has announced an improved model of its "Ice Slinger Hose". Designed to blow crushed ice into refrigerator rail cars, trucks, airplanes, fishing boats and other fresh food carriers, the hose is said to be lighter, more flexible and easier to handle than the 1955 model. The new product is a wire-inserted, hand-built hose with a smooth, one-eighth inch tube compounded of special rubber with extreme resistance to abrasion. The cover is fluted. The hose will be available in sizes with inside diameters ranging from three to five inches and lengths from three to fifty feet. It is used ordinarily in lengths of 10, 15 and 20 feet.

## Nefslabs Traffic Marking Strips

Repainting of faded traffic lines is said to be completely eliminated through the use of new plastic marking strips and markers produced by J. W. Neff Laboratories, Inc., Stockertown, Penna. Made of flexible Geon vinyl, the strips and markers are available in a variety of colors. Called "Nefslabs", they are applied to a pavement with a special cold adhesive. Nefslabs are compounded to be tough, yet flexible so that they do not become too brittle even at sub-zero temperatures nor too soft in the hottest weather. They do not crack or chip from the constant pounding of traffic and the rigors of weathering. Nefslabs are also said to resist the effects of water, gasoline, oil and salts. The plastic is colored throughout, always presenting a bright surface. Nefslabs are available in strips and in individual marker sizes.

## Neoprene Foot Warmer

A new neoprene foot warmer introduced by the General Industrial Co., 5750 N. Elston Ave., Chicago 30, Ill., is designed to be used in the office, store, factory or home to provide increased foot comfort on cold days.

The 14 by 21-inch rubber mats throw off a gentle warmth that keep personnel healthy and comfortable. The foot warmers use less power than a 75 watt light bulb.

## Herco Sponge Back Matting

Designed for use in factories, stores, offices and the home, "Herco Sponge Back Matting", produced by the Hecht Rubber Co., Inc., 14 East Bay St., Jacksonville, Fla., is said to relieve fatigue for personnel who stand for long periods of time. The non-skid matting won't slip or slide, is easily rolled and easily cleaned. Oil and grease resistant, the matting is available in ¼, ⅜ or ½-inch thicknesses. Made of resilient corrugated matting bonded to sponge rubber, the product is available in black, brown, red, green and grey.


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A PRIMARY PLASTICIZER for chloroprene rubbers, Ohopex R-9 is excellent for end products that require good aging under both high and low temperature conditions.

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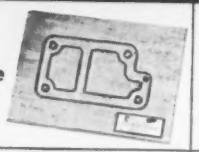


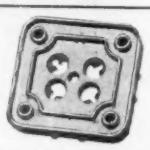


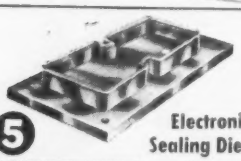


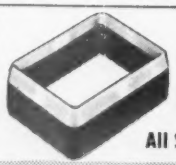


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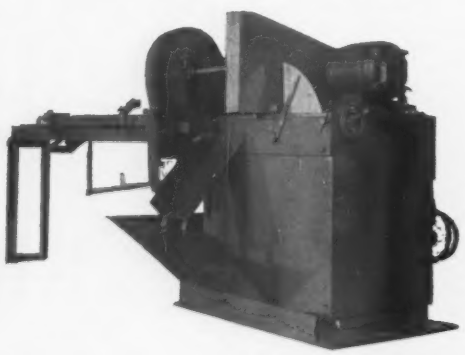

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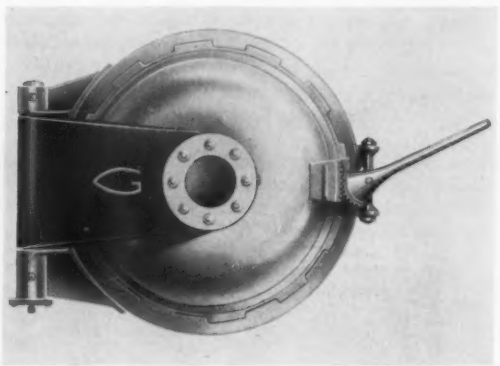
# New Equipment

## Gussett Quick-Opening Vulcanizer Door

A new quick-opening door for autoclaves and vulcanizers, which is said to offer important advantages over older doors of this type, has been designed by Gussett Boiler & Welding, Inc., Canton 10, Ohio. An outstanding feature of the new door is a large diameter boss on which the rigid, lightweight, all-fabricated door rotates to engage the lugs for sealing. Ranging from eight inches to 24 inches in diameter, depending on the size of the door, and welded firmly to the convex face



of the door, it provides many times the bearing area possible with small-diameter pins formerly used, producing a more stable assembly, eliminating wobble and difficult closing due to pin and bearing wear and insuring uniform sealing. Despite the greatly increased bearing area, however, the new door is said to rotate freely on the large gun-lubricated bronze bearing. The larger bearing also permits a wider hinge section, providing increased strength and rigidity.

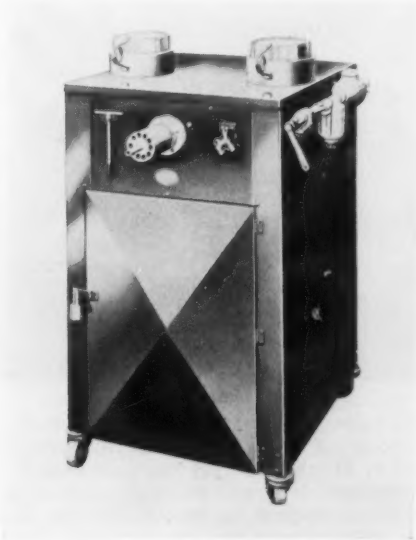
Lugs on both the door and the heavy cast shell are precision machined to provide accurate fitting around the entire diameter and perfect sealing. The hinge pin is a large diameter precision ground shaft rotating in heavy, gun-lubricated bronze bushings and a heavy roller thrust bearing supports the weight of the door. Another feature of the new design is the universal-type rack and pinion employed for engaging and rotating the door. While not considered necessary on smaller units, it is especially valuable on heavier doors. (Permanently attached and always ready for use, it provides positive action with minimum effort, eliminating the use of heavy bars for rotating the door and the accompanying danger of injury.) The pinion lever is hinged so that it can be swung back out of the way when not in use to eliminate interference with opening and closing of the door.

---

Clean, round holes in sheet rubber and sheet plastic can be drilled quickly and easily on a common drill press with the use of a new **chuck for hollow drills** which has been developed by the Pioneer Toledo Corp., Toledo, Ohio. The chuck handles drills in 14 sizes from ⅛ to ½ inch and was designed especially for the small run jobs that heretofore required special production drilling machines and special chucks.

## Pro-Seal Master Mixer

Coast Pro-Seal & Manufacturing Co. of Los Angeles, Calif., has developed and recently started marketing stationary and portable equipment designed specifically to properly mix and apply equal part "Thiokol" Liquid Polymer compounds. The compounds recommended by the company for use in their mixer consist of equal parts of Thiokol base components manufactured in contrasting colors. Each part is conveyed through equalized metering



gear pumps into a mixing head, thus insuring an equal amount of each component for mixing. The mixed compound is dispersed at the rate of one pound per minute by the mixer. It handles two gallons (approximately 20 pounds) of compound without re-loading.

With the Pro-Seal mixing equipment in operation, the substantial saving in the labor required for accurate weighing and mixing is further enhanced by the fact that spillage or waste of materials through adhesion to containers is also eliminated. Uniformity of the two-part mix is assured since each part is of a different color and the effectiveness of mixing can readily be gauged by simple visual inspection of the final compound. The Pro-Seal mixing equipment has a broad field of application.

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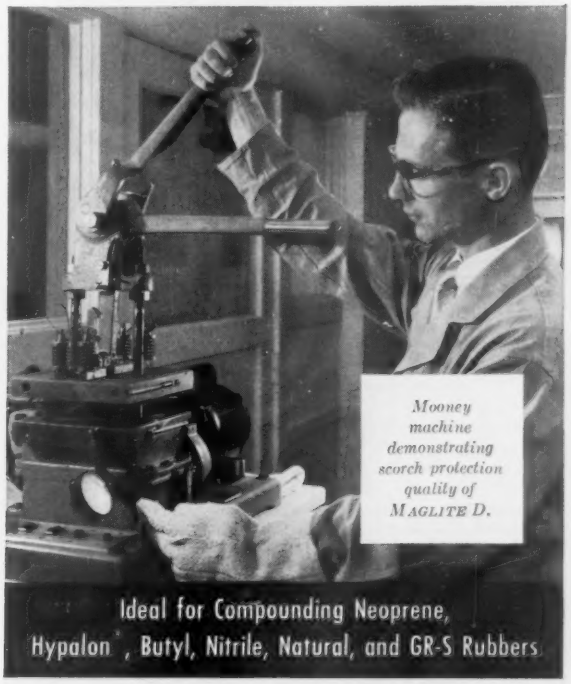
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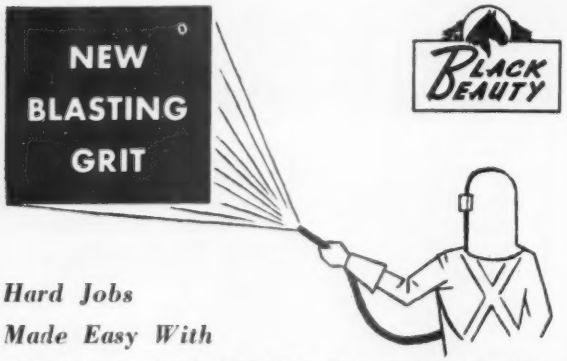

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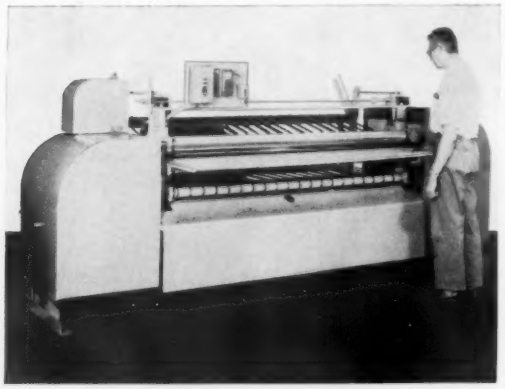
## Case-Maul Splitting Machine

A device that will cut to any desired thickness most any soft material such as foam rubber, sponge rubber, felt, insulation and similar materials has been designed by the Case-Maul Manufacturing Co., Mansfield, Ohio. Known as the Universal Splitting Machine, it is said that the new model will handle any diameter roll of material, and widths up to 80 inches depending on model.

Features of the new machine consist of a safety bar



in front of the machine that cuts off the master switch when accidentally bumped. The unit splits material eight inches thick, (for mattresses) five inches top half, three inches bottom half. It will also split material to a uniform thickness down to ⅛ inch, thinner on some materials. The splitting knife is 2¼ inches wide with a bevel edge. The splitting knife is carried on 24 inch diameter wheels with rubber bands to insure long life and stability. The roll rewinder is driven by chain drive. There are no V-belts or pulleys that might slip.

Electrical specifications are: 3 h.p. motor for splitting knife Models 90 and 100, 5 h.p. motor for splitting knife Model 110, and ¾ h.p. motors for feeder roll and knife sharpener, all models.

---

Utilizing a single heater to permit an operator to handle drape forming and vacuum forming production runs simultaneously, a new self-contained unit, called the **VacForm Model 88-FM**, has been designed by the Vacuum Forming Corp., Port Washington, N. Y. The unit requires 28 x 90 inches of floor space, stands 54 inches high, weighs 500 pounds and is durably constructed of welded steel throughout. Features of the unit include surface-ground 18 x 18-inch platens, vacuum valve timers, vacuum gauge, a 15-gallon vacuum surge tank, and automatic cycle control of the vacuum operation.

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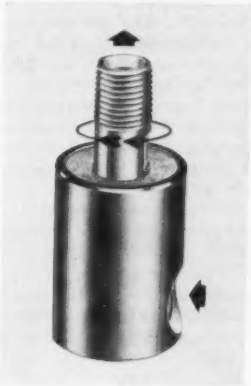
## Barco Single Plane Swivel Joints

Introduction of a new line of lightweight, low cost, small size swivel joints, for use in hydraulic or pneumatic service on pipe, tubing or hose, has been announced by the Barco Manufacturing Co., Barrington, Ill. These new joints are of the single plane swivel type, in contrast with the company's flexible self-aligning swivel type. They are designed, primarily, to provide for up to 360° turning or rotating motion on machinery



or other places where flexible piping or tubing is required. Their chief advantage is that they provide for long service life, without maintenance or replacement. They can be used advantageously as connectors for hose in reducing hose length by eliminating sharp bends and increasing hose life by relieving all twisting stresses.

The company is producing these joints in ball bearing and thrust bearing types suitable for pressure as high as 2,000 psi, depending on the size of the joint. Temperature ratings recommended range from —20° to 225° F. The joints are equipped with O-ring seals and have low rotating torque at all pressures. The bearings are sealed and require no lubrication maintenance in normal service. Standard sizes are ¼ and ½ inch while ⅜ and ¾ inch sizes are available on quantity orders. The joint casing is machined from aluminum and the rotating shaft from steel.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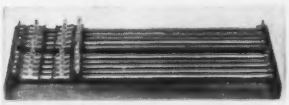

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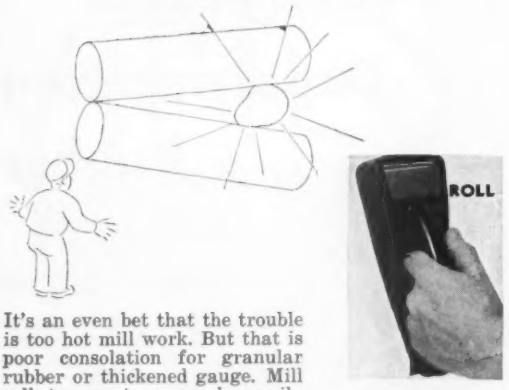


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# Reviews

## BOOKS

**ASTM Standards on Plastics.** Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. 6 x 9 in. 812 pp. $5.75.

This compilation presents in convenient form ASTM standards and tentative specifications, methods of physical testing, recommended practices, methods of analysis, and definitions of terms pertaining to plastics. It has been substantially revised since the previous edition was published in May 1954. Of the total of 143 specifications and tests, four are entirely new and 41 have been either revised, reaffirmed or advanced from tentative status to standard. Two others have been discontinued, one has been replaced, and another has been redesignated as a general method applicable to materials other than plastics. The standards in the book have been developed by ASTM Committee D-20 on Plastics and will be of especial value to plastics engineers and to those concerned with the design and production of plastics and items in which plastics are used.

In addition to the standards prepared by Committee D-20, there have been included a number of specifications, methods of testing, recommended practices, and definitions applying to plastics in the electrical insulation field which are under the jurisdiction of Committee D-9 on Electrical Insulating Materials. Other standards that are of interest in the testing of plastics and have been developed by other Society committees are also included.

•

**Strengthening Management for the New Technology.** (General Management Series No. 176). American Management Association, 330 West 42nd St., New York 36, N.Y. 6 x 9 in. 68 pp. $1.75.

The accelerated pace of industrial growth requires that increased attention be paid to the impact of technological change on all areas of management. The implications of new developments are particularly significant when the organizational and human aspects of management are considered. This new publication in AMA's general management series discusses three phases of the new technology: (1) Developing patterns in company organization; (2) Management development during a period of industrial and social change, and (3) The impact of automation on company organization and on managerial problems. Of particular interest is a paper by John Markle, vice president—personnel, Bell Telephone Co. of Pennsylvania. Mr. Markle describes the "Institute of Humanistic Studies for Executives", the 10-month program in the humanities at the University of Pennsylvania that has received widespread attention from the press.

•

**Chemical Trade Names and Commercial Synonyms (Second Edition).** By Williams Haynes. Published by the D. Van Nostrand Co., 120 Alexander St., Princeton, N. J. 6 x 9 in. 480 pp. $8.00.

Containing over one quarter more entries than its predecessor, this revised edition gives precise and complete definitions of the special names used in the modern chemical industry. It covers both abbreviations adopted to simplify long technical names of the newer organic compounds and those terms coined by manufacturers. The terms listed in this book are confined to chemicals and chemical specialties sold in the industrial field. It includes specialties used in the rubber, paint, varnish, textile, metallurgical and other industries. Definitions comprise generally two parts: first, the composition, and second, the chief uses. The uses recorded are indicative rather than inclusive. The uses of many items are literally legion and in many cases the applications are exceedingly specialized, so that users are urged to write the manufacturers direct—hence the index with their addresses—for detailed information.

## BOOKLETS, CATALOGS, etc.

**Salt and Water, Power and People.** By Robert E. Thomas. Published by Hooker Electrochemical Co., Niagara Falls, N. Y. 6 x 9¼ in. 145 pp.

This book was written to celebrate the fiftieth anniversary of the Hooker Electrochemical Company. Written in chronological order, the book outlines the company's founding to its present position in the chemical industry. Included is a short biographical sketch of Elon H. Hooker, founder of the company. The Townsend Process, an electrolytic method for the manufacture of chlorine and caustic soda, is discussed. A cut-away view illustrates the operation of the cell. This process was the foundation upon which the company was built. Succeeding chapters recount the formative years of the company. One chapter treats with the disastrous fire of 1910 that destroyed most of the company's buildings and equipment. In addition, the operations of the company during both World Wars, the depression decade (1930-39), and the post-war era (1946-1955) are discussed and illustrated. Throughout the book biographical sketches of the company's original as well as its present executive staff are given.

•

**Spiral Flow Intensive Mixers for Rubber and Plastics.** Stewart Bolling & Co., Inc., 3190 East 65th St., Cleveland 27, Ohio. 8½ x 11 in. 12 pp.

The trend in intensive mixers is to higher speeds and higher chamber pressures, doubling and even tripling the capacity considered good three or four years ago from the same size machine. Discussed in this catalog are the company's line of internal mixers which were designed for high speeds and pressures. Illustrations depict such special features of the mixer as spiral-flow sides; split end frames which allows for easy accessibility; rotors with full-circle end flanges that hold the batch on the rotor flutes rather than pile or drag it, and anti-friction bearings that maintain true centers within very minute limits. Also shown are various models of the company's mixers, including a practical laboratory mixer which retains all the features of the production machines. In addition, specifications of the mixers are given which include the size and capacity of the machine as well as the capacity of crude rubber and compounded stocks the mixer will take.

•

**How Abrasive-Belt Grinding Increases Production.** Engelberg Huller Co., 831 West Fayette St., Syracuse, N.Y. 11 x 8½ in. 32 pp.

Included in this booklet are 46 illustrated case histories of various grinding operations. Of special interest is the section devoted to the removal of flash from a thermoplastic knob and the section in smoothing the lap joint of celluloid stocking display forms. Application studies are grouped according to each of five types of abrasive belt machining: (1) Platen, (2) Contact Wheel, (3) Formed Wheel, (4) Centerless and (5) Flexible Belt. These studies cover such materials as plastics, glass and wood. Discussed in each cost reduction study are such items as increased production; elimination of tooling costs; reduction in excess stock allowances; greater machine versatility, and simplicity of fixtures when required.

•

**Celogen.** By R. R. Barnhart. (Compounding Research Report No. 36). Naugatuck Chemical Division, U. S. Rubber Co., Naugatuck, Conn. 8½ x 11 in. 16 pp.

This technical bulletin describes the applications of this blowing agent in sponge rubber and expanded plastics. Typical compounds employing GR-S 1503, Paracril C and BJ, Neoprene GN and W and brown crepe are shown. The non-discoloring, non-staining and non-toxic properties of Celogen are stressed. A section of the bulletin is devoted to the use of the material in polyvinyl chloride. Equipment to use, suggested compounds, properties and processing data are given. Photographs showing the manufacture of rubber articles using the material are also given.

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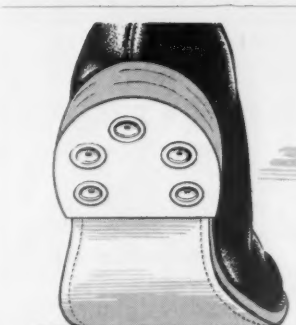

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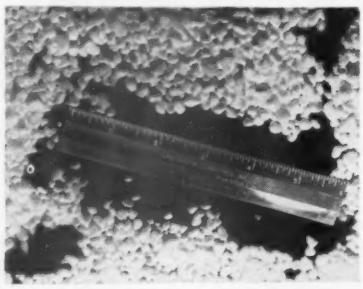

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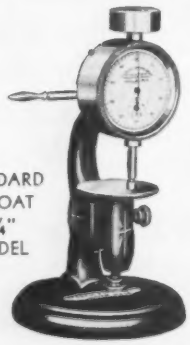

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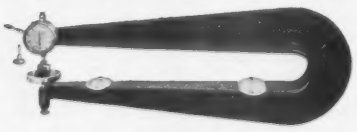

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**Harvest of Research: The Story of the Goodyear Chemical Division.** By David Dietz. Goodyear Tire & Rubber Co., Akron, Ohio. 6 x 9 in. 68 pp.

The progress of American industry has been the result of courageous business ventures firmly founded on brilliant scientific research and sound engineering development. In this booklet, Dr. David Dietz, science editor of the Scripps-Howard newspapers and a recognized authority on American industrial science, tells the story of one such venture, the successful entry of the Goodyear Tire & Rubber Company into the field of chemical materials and the creation of the Goodyear Chemical Division. Outlined in the booklet is the Division's role in the rubber, plastic, paint, textile and paper industries. Attention is also given to the company's laboratories and pilot plant operations in regards to new developments. The section devoted to the rubber industry outlines the composition, use and general make-up of such materials as Plioflex synthetic rubbers; Pliolite synthetic latices; Chemigum synthetic rubber; Pliolite reinforcing resins; and Wing-Stay S, the non-staining, non-discoloring antioxidant.

•

**Safe Processing, Water-Resistant Neoprene Compounds with Exceptional Storage Life.** (Report BL-302). Elastomers Division, E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6¼ x 9½ in. 4 pp.

This report amplifies Report BL-265, published in August, 1954. It includes all information contained in the earlier report and new data on the choice of carbon blacks. Included in the report are practical Neoprene Type WRT compounds based on a curing system of Thionex in combination with red lead. The effects of sulfur and increased concentration of Thionex are also given. Data is given for bin storage tests as well as volume increase in 158°F. water for 7, 14 and 28 days. Other tests include tensile, elongation and durometer given on cures of 10 and 20 minutes at 307°F. The effect of carbon blacks in a Neoprene Type W compound gives a comparison between channel and furnace blacks. In addition, scorch data is included on a neoprene compound that was stored for 18 months, which included two extremely hot summers. The stock, according to the report, sheeted out smoothly without apparent sign of set-up.

•

**Care and Maintenance of Industrial V-Belts.** Industrial Products Division, B. F. Goodrich Co., Akron, Ohio. 8½ x 11 in. 16 pp.

Included in this illustrated manual is the care and maintenance of industrial V-belts. The manual covers the following topics: designing the new drive; double matching; installation of belts; how V-belts grip; importance of tension; drive alignment; how to clean; storage. A V-belt service chart, which illustrates typical causes of belt failure, is featured. Full-scale photographs show what belts look like after failure due to any of the following causes: oil deterioration; cover fabric rupture; slip burn; ply separation; ruptured cords; worn belt sides; snub break; distorted belt; abrasion and base cracking. Ways to prevent these typical causes of belt failure are outlined.

•

**Modern Laboratory Appliances (Supplement to Catalog No. 111).** Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Penna. 7½ x 10½ in. 116 pp.

This catalog supplement describes in condensed form all of the instruments, apparatus, glassware, laboratory furniture and accessories added to Fisher stocks since the 1952 publication of the major catalog. Woodcuts as well as action photographs are used. Included are new instruments, especially in the electrochemical, petroleum and clinical fields. For the reader's convenience, the supplement (which can be inserted inside the front cover of the major catalog) has not been burdened with reagents; instead, they are listed separately in a special chemical index.

**Compounding for Insulated Wire and Cable.** By C. W. Lawson. (Report No. 37). Naugatuck Chemical Division, U.S. Rubber Co., Naugatuck, Conn. 8½ x 11 in. 36 pp.

A number of insulated wire and cable compounds based on natural rubber, GR-S types, neoprene and Butyl rubber are given in this technical bulletin. Due to the present-day importance of continuous vulcanization, laboratory data obtained in a flash vulcanizer are shown to simulate the results from such rapid factory cures. To facilitate the minor changes which are usually necessary to adust any laboratory compound to local factory conditions, cure data is given at several time intervals corresponding to those used in the factory. Tubing data obtained on a No. ½ Royle laboratory extruder, equipped with a Garvey die, has been included to indicate the probable variations in extrusion and processing characteristics shown by the various compounds. Included are compounds for code wire insulation to meet Underwriters' Laboratories' standards for Type R material; performance grade insulation to meet the physical properties of ASTM D755-54T; heavy-duty neoprene jacket to meet the physical properties of ASTM D752-54T; and Butyl RHW insulation to meet the physical properties of Underwriters' Laboratories' provisional requirements.

•

**Stearates: Their Properties and Uses.** (Bulletin No. 55-2). Witco Chemical Co., 122 East 42nd St., New York 17, N. Y. 8½ x 11 in. 40 pp.

Designed for readability, this bulletin lists the composition of 46 metallic stearates, shows graphically the industries in which they are used, and presents an analysis of recommended applications. Other helpful data include an explanation of the company's analytical procedures, government specifications for metallic stearates, shipping information, and a guide to other company products. A list of the various types of metallic stearates and the industries where they have proved of value are shown in tabular form. Such industries as rubber, plastics, leather, cosmetics, explosives, ceramics, cement, metal working, oils, paints, paper, pharmaceuticals, textiles and varnishes are mentioned.

•

**Natural Rubber: How Nature Plus Science Serve Mankind.** Natural Rubber Bureau, 1631 K Street, N.W., Washington 6, D.C. 5½ x 8 in. 16 pp.

The Natural Rubber Bureau has issued its latest fact booklet on natural rubber. The booklet is primarily intended for distribution through plant reading racks and schools. The format combines a new visual and editorial technique that makes it easier to understand the facts presented. In simple, easy-to-grasp form the Bureau's new publication provides figures on production and consumption, tells how and where natural rubber is grown, and in 12 easily remembered steps recounts natural's historical background. Up to 25 copies are available for plant distribution without charge.

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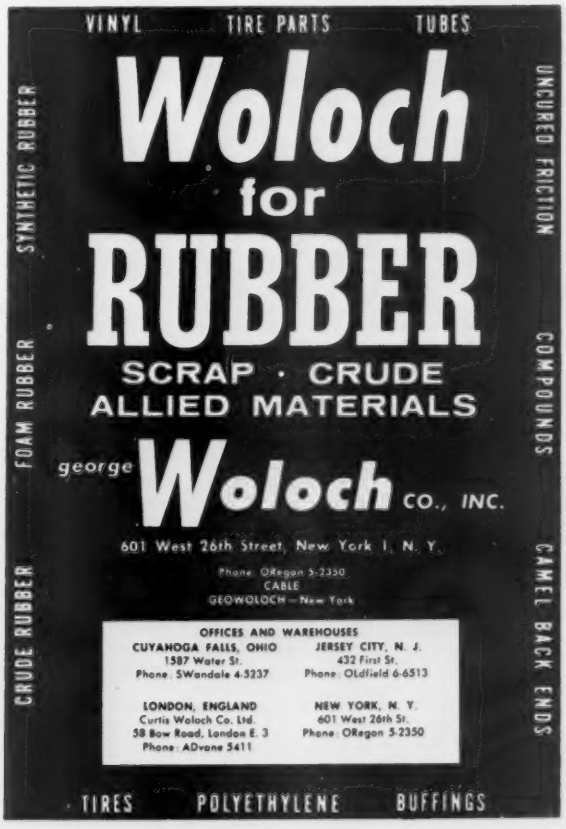


# MARKETS

# NEWS-PRICES

**NEW YORK, JANUARY 9, 1956**

## Natural Rubber

Since our last report (December 9), the price of spot rubber on the New York Commodity Exchange has moved in the range of 600 points, high for the period being 49.00c reached on December 12, 1955, and low being 43.00c reached on January 9. The average price of spot rubber for the month of December was 48.40c based on 21 trading days. This compares with an average of 44.95c in November.

Indecision seems to be the order of the day in the natural rubber market. Some uneasiness has developed over business conditions after the first quarter of the current year. Much of this uneasiness is centered about a probable curtailment in automobile production which will mean, of course, a lower rate of new rubber consumption than there was in 1955.

The trade believes that there is little in surrounding conditions to cause a market swing in one direction or another. Some are inclined to stress that United States consumers have fairly well satisfied their requirements for the first quarter. It is also reported that first hand sellers in the East are showing a greater willingness to sell rubber to the United States.

### *London Journal Comments*

In a recent comment on the natural rubber situation, the *Financial Times* of London observed that the outlook for natural rubber in 1956 will depend mainly on U. S. business activity. The journal states that American synthetic rubber output has been insufficient to meet the demands of the automotive industry and natural rubber has benefited accordingly.

With the period of low seasonal production and relatively high demand approaching, it seems unlikely that there will be any decisive change during the early part of 1956. But it seems certain, the publication goes on to say, that natural rubber will face a sterner challenge on price from synthetic rubber in 1956.

This challenge, together with the future of the American automobile industry and the size of future Russian purchases, which have been an important factor in sustaining the market in 1955, will be the decisive influences on the market in 1956.

### *Ceylon Faces Problem*

The Ceylonese government is reported to be debating whether the country's entry into the United Nations will affect its trade agreement with Communist China. Under this agreement, Ceylon sells 50,000 tons of rubber to Red China annually in exchange for 270,000 tons of rice.

Under a United Nations resolution adopted during the Korean conflict, member countries were prohibited from selling strategic raw materials to Communist China. The resolutions were adopted when Ceylon was not a member of the United Nations and the question now is whether it will apply to Ceylon with her admission to the world organization. The agreement between Ceylon and Red China is for five years and is now in its third year.

## Price Data

**Closing Rubber Prices on New York Commodity Exchange (No. 1 R.S.S. Contract)**

FROM DECEMBER 10 TO JANUARY 9

| Dec. | Spot | March | May | July | Sept. | Sales |
|---|---|---|---|---|---|---|
| 10 | .... | .... | .... | .... | .... | .... |
| 11 | .... | .... | .... | .... | .... | .... |
| 12 | 49.00 | 44.95 | 40.40 | 38.40 | 37.00 | 244 |
| 13 | 47.00 | 43.45 | 39.55 | 37.50 | 36.00 | 270 |
| 14 | 48.00 | 44.25 | 40.35 | 38.40 | 36.75 | 210 |
| 15 | 48.00 | 44.00 | 40.45 | 38.75 | 37.10 | 173 |
| 16 | 47.00 | 43.75 | 40.40 | 38.70 | 37.15 | 103 |
| 17 | .... | .... | .... | .... | .... | .... |
| 18 | .... | .... | .... | .... | .... | .... |
| 19 | 48.00 | 45.00 | 41.55 | 39.60 | 37.90 | 348 |
| 20 | 46.75 | 44.40 | 40.95 | 39.10 | 37.50 | 217 |
| 21 | 47.00 | 45.05 | 41.75 | 40.00 | 38.25 | 146 |
| 22 | 47.00 | 45.75 | 42.15 | 40.20 | 38.45 | 425 |
| 23 | 47.00 | 46.05 | 42.30 | 40.40 | 38.65 | 121 |
| 24 | .... | .... | .... | .... | .... | .... |
| 25 | .... | .... | .... | .... | .... | .... |
| 26 | .... | .... | .... | .... | .... | .... |
| 27 | 47.00 | 46.00 | 42.15 | 40.10 | 38.65 | 220 |
| 28 | 46.00 | 44.80 | 40.85 | 39.10 | 37.80 | 328 |
| 29 | 46.25 | 45.25 | 41.40 | 39.50 | 37.95 | 438 |
| 30 | 45.50 | 45.30 | 41.65 | 39.50 | 38.00 | 448 |
| 31 | .... | .... | .... | .... | .... | .... |
| Jan. | | | | | | |
| 1 | .... | .... | .... | .... | .... | .... |
| 2 | .... | .... | .... | .... | .... | .... |
| 3 | 44.50 | 44.10 | 40.64 | 38.80 | 37.50 | 310 |
| 4 | 45.00 | 44.39 | 41.25 | 39.55 | 38.10 | 200 |
| 5 | 45.00 | 44.15 | 41.10 | 39.60 | 38.00 | 137 |
| 6 | 44.75 | 43.75 | 40.70 | 39.15 | 37.70 | 284 |
| 7 | .... | .... | .... | .... | .... | .... |
| 8 | .... | .... | .... | .... | .... | .... |
| 9 | 43.00 | 42.10 | 39.26 | 37.70 | 36.40 | 258 |

**Outside Market**

| | |
|---|---|
| No. 1 Ribbed Smoked Sheets: | |
| Spot | .44¼ |
| January | .42½ |
| February | .42 |
| Thin Latex Crepe: | |
| Spot | .46 |
| Thin Brown Crepe, No. 2 | .35 |
| Flat Bark Crepe | .27 |

**London Market**

*(Standard Smoked Sheets)*

| | |
|---|---|
| February | 39.93 - 40.07 |
| Apr.-June | 39.05 - 39.20 |

**Singapore Market**

*(Standard Smoked Sheets)*

| | |
|---|---|
| February | 39.05 - 39.16 |

**Middling Upland Quotations**

| | Dec. 9 | January 9 | | |
|---|---|---|---|---|
| | Close | High | Low | Close |
| March | 33.27 | 34.00 | 33.92 | 33.94 |
| May | 32.57 | 33.48 | 33.30 | 33.44 |
| July | 31.71 | 32.13 | 31.86 | 32.12 |

## Notes and Quotes

"It is common knowledge that a number of automobile manufacturers will demand and get a 14-inch tire with increased cross-section for use on 1957 models," according to H. H. Waters, director of engineering for the Firestone Tire & Rubber Co. In addition to the trend toward a smaller, softer and wider tire for passenger vehicles, Mr. Waters foresees the general use of tubeless truck tires in 1956, and the eventual adoption of tubeless tires for farm equipment. He also foresees the use of full-depth foam rubber cushioning for transportation seating, instead of topper pads, and the increasing use of foam rubber to improve the safety characteristics of automobiles. Mr. Waters predicts the increasing application of the air-spring, a rubber and fabric air chamber designed to replace steel springs in vehicle suspensions. He states that the development of a synthetic rubber with characteristics like those of natural rubber promises "to lessen or even eliminate the government rubber stockpile which now ties up a billion dollars of federal funds."

## Synthetic Rubber

In its recent report to Congress on the proposed sale of the Institute, West Va., synthetic rubber facility to Goodrich-Gulf Chemicals, Inc., the Rubber Producing Facilities Disposal Commission gave some thought to current and planned capacities of the synthetic rubber plants now in private hands. It was indicated that the twelve plants which were sold by the government to industry were equipped to turn out 733,000 long tons of synthetic rubber annually. Sale of the Institute plant will raise the total to 855,000 long tons.

Expansions scheduled for completion within a year or so will lift the grand total to about 1,100,000 long tons. This last figure includes a 40,000 long ton facility to be built by the General Tire & Rubber Co. Some six companies now have plans afoot for expansion of their facilities. In addition, three other companies have some expansion plans in the works but have made no definite announcement.

### *Expansion Estimates*

In computing its figures on expansion plans, the Disposal Commission had to take into account the question of oil additives. Some companies, in reporting their expansion plans, have included in capacity figures, oil extenders. The Disposal Commission, on the other hand, has deleted the oil from these figures, hoping to achieve a figure that would be representative only of the raw rubber.

The Disposal Commission's aim in presenting an analysis of the expansion figures was to assist Congress in its determinations on the anti-trust aspects of the sale of Institute to Goodrich-Gulf. While Goodrich-Gulf will have about 25% of the production capacity for GR-S type rubber, if it succeeds in purchasing Institute, that percentage will drop to 19.9% when currently announced expansions are completed.

On the other hand, acquisition of Institute by Goodrich-Gulf will give the "Big Four" of the rubber industry control of about 70% of the synthetic rubber producing capacity. Without Institute, the Big Four control about 60% of the capacity.

It may be that some in Congress will "view with alarm" this concentration of capacity in the hands of a relatively few companies. In this light, and in consideration of the fact that 1956 is an election year, some Congressional opposition may be heard relative to the sale of the Institute plant.

### *U. K. to Import Synthetic*

According to reports from Kuala Lumpur, America will supply Britain with 70,000 long tons of synthetic rubber in 1956. This was revealed when Malaya's Minister of Economic Affairs stated that he had received a message from the British Colonial Secretary turning down Malaya's requests that these imports by Britain be stopped.

H. A. Campbell, chairman of the Malayan Rubber Producers Council, stated that the imports of synthetic rubber by Britain will mean that about $40,000,000 (American) will be spent from the sterling pool to which Malaya contributes. He stated that this was "most excessive and unfair" to Malayan natural rubber producers. British manufacturers claim that the use of natural rubber exclusively is pricing them out of world markets, thereby making a fair case for the importing of synthetic.

# PRICES OF COMMERCIALLY AVAILABLE SYNTHETIC RUBBER POLYMERS

*(dry types—per pound carload unless otherwise specified)*

### Butadiene-Acrylonitrile Types

| | |
|---|---|
| Butaprene NAA | .5400 [1] |
| Butaprene NF | .4900 [1] |
| Butaprene NL | .5000 [1] |
| Butaprene NXM | .5800 [1] |
| Chemigum N1 | .6400 [2] |
| Chemigum N3 | .5800 [2] |
| Chemigum N5 | .5800 [2] |
| Chemigum N6 | .5000 [2] |
| Chemigum N7 | .5000 [2] |
| Hycar OR-15 | .5800 [2] |
| Hycar OR-25 | .5000 [2] |
| Paracril B | .5000 [2] |
| Paracril BJ | .5000 [2] |
| Paracril C | .5800 [2] |
| Polysar Krynac 800 | .5000 [2] |
| Polysar Krynac 801 | .5800 [2] |
| Polysar Krynac 802 | .5000 [2] |
| Polysar Krynac 803 | .5000 [2] |

### Butadiene-Styrene Types

| | |
|---|---|
| Ameripol 1001 | .2410 [2] |
| Ameripol 1002 | .2435 [2] |
| Ameripol 1006 | .2410 [2] |
| Ameripol 1500 | .2410 [2] |
| Ameripol 1501 | .2410 [2] |
| Ameripol 1502 | .2410 [2] |
| Ameripol 1703 | .2060 [2] |
| Ameripol 1705 | .2035 [2] |
| Ameripol 1706 | .2035 [2] |
| Ameripol 1707 | .1910 [2] |
| Ameripol 1709 | .1885 [2] |
| Ameripol 1710 | .1885 [2] |
| Ameripol 1711 | .1885 [2] |
| Ameripol 1712 | .1885 [2] |
| ASRC 1500 | .2410 [2] |
| ASRC 1502 | .2410 [2] |
| Baytown 1600 | .1850 [2] |
| Baytown 1601 | .1850 [2] |
| Baytown 1602 | .1850 [2] |
| Baytown 1801 | .1700 [2] |
| Butaprene S-1000 | .2300 [2] |
| Butaprene S-1001 | .2300 [2] |
| Butaprene S-1004 | .2300 [2] |
| Butaprene S-1006 | .2300 [2] |
| Butaprene S-1009 | .2600 [2] |
| Butaprene S-1010 | .2650 [2] |
| Butaprene S-1012 | .2700 [2] |
| Butaprene S-1013 | .2600 [2] |
| Butaprene S-1015 | .2800 [2] |
| Butaprene S-1500 | .2300 [2] |
| Butaprene S-1502 | .2300 [2] |
| Butaprene S-1703 | .1950 [2] |
| Butaprene S-1705 | .1925 [2] |
| Butaprene S-1710 | .1775 [2] |
| Copo 1500 | .2410 [2] |
| Copo 1502 | .2410 [2] |
| Copo 1712 | .1885 [2] |
| Hycar OS-10 | .5500 [2] |
| Naugapol 1016 | .2650 [2] |
| Naugapol 1018 | .2700 [2] |
| Naugapol 1019 | .2650 [2] |
| Naugapol 1021 | .3000 [2] |
| Naugapol 1022 | .2800 [2] |
| Naugapol 1023 | .2850 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| Naugapol 1503 | .2700 [2] |
| Naugapol 1504 | .2950 [2] |
| Philprene 1000 | .2500 [1] |
| Philprene 1001 | .2500 [1] |
| Philprene 1006 | .2500 [1] |
| Philprene 1009 | .2550 [1] |
| Philprene 1018 | .2575 [1] |
| Philprene 1019 | .2525 [1] |
| Philprene 1100 | .1990 [1] |
| Philprene 1104 | .1940 [1] |
| Philprene 1500 | .2500 [1] |
| Philprene 1502 | .2500 [1] |
| Philprene 1503 | .2525 [1] |
| Philprene 1600 | .2000 [1] |
| Philprene 1601 | .2000 [1] |
| Philprene 1602 | .2000 [1] |
| Philprene 1605 | .1940 [1] |
| Philprene 1703 | .2120 [1] |
| Philprene 1706 | .2100 [1] |
| Philprene 1708 | .1970 [1] |
| Philprene 1711 | .1940 [1] |
| Philprene 1712 | .1940 [1] |
| Philprene 1803 | .1800 [1] |
| Plioflex 1000 | .2425 [2] |
| Plioflex 1006 | .2425 [2] |
| Plioflex 1502 | .2425 [2] |
| Plioflex 1703 | .2075 [2] |
| Plioflex 1710 | .1900 [2] |
| Polysar Krylene | .2410 [2] |
| Polysar Krylene NS | .2410 [2] |
| Polysar Krynol | .2000 [2] |
| Polysar Krynol NS | .2050 [2] |
| Polysar S | .2410 [2] |
| Polysar S-50 | .2410 [2] |
| Polysar S-65 | .2410 [2] |
| Polysar S-X 371 | .2550 [2] |
| Polysar SS-250 | .3000 [2] |
| S-1000 | .2300 [2] |
| S-1001 | .2300 [2] |
| S-1002 | .2325 [2] |
| S-1006 | .2300 [2] |
| S-1011 | .2325 [2] |
| S-1013 | .2300 [2] |
| S-1100 | .1850 [2] |
| S-1500 | .2300 [2] |
| S-1501 | .2300 [2] |
| S-1502 | .2300 [2] |
| S-1600 | .1850 [2] |
| S-1601 | .1850 [2] |
| S-1602 | .1850 [2] |
| S-1703 | .1950 [2] |
| S-1705 | .1925 [2] |
| S-1706 | .1925 [2] |
| S-1707 | .1800 [2] |
| S-1709 | .1775 [2] |
| S-1712 | .1775 [2] |
| S-1801 | .1700 [2] |
| S-2000 | .2275 [2] |
| S-2101 | .2250 [2] |
| Synpol 1000 | .2425 [2] |
| Synpol 1001 | .2425 [2] |
| Synpol 1002 | .2450 [2] |
| Synpol 1012 | .2425 [2] |
| Synpol 1006 | .2425 [2] |
| Synpol 1007 | .2425 [2] |
| Synpol 1009 | .2475 [2] |
| Synpol 1013 | .2500 [2] |
| Synpol 1500 | .2425 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| Synpol 1551 | .2425 [2] |
| Synpol 1703 | .2075 [2] |
| Synpol 1707 | .1925 [2] |
| Synpol 1708 | .1950 [2] |
| Synpol 1710 | .1900 [2] |
| Synpol 1711 | .1900 [2] |

### Butyl Rubbers

| | |
|---|---|
| Enjay Butyl 035 | .2300 [2] |
| Enjay Butyl 150 | .2300 [2] |
| Enjay Butyl 165 NS | .2400 [2] |
| Enjay Butyl 215 | .2300 [2] |
| Enjay Butyl 217 | .2300 [2] |
| Enjay Butyl 218 | .2300 [2] |
| Enjay Butyl 268 NS | .2400 [2] |
| Enjay Butyl 325 | .2300 [2] |
| Enjay Butyl 365 NS | .2400 [2] |
| Polysar Butyl 100 | .2450 [3] |
| Polysar Butyl 101 | .2775 [2] |
| Polysar Butyl 200 | .2450 [3] |
| Polysar Butyl 300 | .2450 [3] |
| Polysar Butyl 301 | .2550 [3] |
| Polysar Butyl 400 | .2450 [3] |

### Neoprene

| | *(prices l.c.l.)* |
|---|---|
| Neoprene Types AC and CG | .5500 [2] |
| Neoprene Type GN | .4100 [2] |
| Neoprene Type GN-A | .4100 [2] |
| Neoprene Type GN-A-P | .3400 [2] |
| Neoprene Type GN-P | .3400 [2] |
| Neoprene Type GN-Special | .3400 [2] |
| Neoprene Type GN-A-Special | .3400 [2] |
| Neoprene Type GRT | .4200 [2] |
| Neoprene Type KNR | .7500 [2] |
| Neoprene Type S | .4200 [2] |
| Neoprene Type W | .3900 [2] |
| Neoprene Type WHV | .3900 [2] |
| Neoprene Type W-P | .3400 [2] |
| Neoprene Type W-Special | .3400 [2] |
| Neoprene Type WRT | .4500 [2] |

### Silicone Rubbers

| | *(prices l.c.l.)* |
|---|---|
| GE (compounded) | 2.50 [2] |
| GE Silicone Gum (not compounded) | 4.00 [2] |
| Silastic (compounded) | 1.95 [2] |

### Polysulfide Rubbers

| | *(prices l.c.l.)* |
|---|---|
| Thiokol Type A | .4700 [2] |
| Thiokol Type FA | .6400 [2] |
| Thiokol PR-1 | .9500 [2] |
| Thiokol Type ST | 1.00 [2] |

*(latices—all prices per pound dry weight)*

### Butadiene-Acrylonitrile Types

| | |
|---|---|
| Butaprene N-300 | .4600 [1] |
| Butaprene N-400 | .5400 [1] |
| Butaprene N-401 | .5400 [1] |
| Chemigum 200 | .4900 [2] |
| Chemigum 235 | .5400 [2] |
| Chemigum 236 | .5400 [2] |
| Chemigum 245 | .4600 [2] |
| Chemigum 246 | .4600 [2] |
| Hycar 1512 | .4600 [2] |
| Hycar 1551 | .5400 [2] |
| Hycar 1552 | .4600 [2] |
| Hycar 1561 | .5400 [2] |
| Hycar 1562 | .4600 [2] |
| Hycar 1571 | .5900 [2] |
| Hycar 1572 | .5100 [2] |
| Hycar 1577 | .4600 [2] |

### Butadiene-Styrene Types

| | |
|---|---|
| Butaprene S-2000 | .2600 [2] |
| Butaprene S-2001 | .2600 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| Butaprene S-2002 | .2850 [2] |
| Butaprene S-2003 | .2950 [2] |
| Butaprene S-2004 | .2950 [2] |
| Butaprene S-2006 | .2600 [2] |
| Copo 2101 | .2800 [2] |
| Copo 2102 | .3100 [2] |
| Copo 2105 | .3100 [2] |
| Copo X-765 | .2900 [2] |
| Pliolite 2101 | .3000 [2] |
| Pliolite 2104 | .3200 [2] |
| Pliolite 2105 | .3200 [2] |
| Pliolite X-765 | .3000 [2] |
| Naugatex 2000 | .2630 [2] |
| Naugatex 2001 | .2630 [2] |
| Naugatex 2002 | .2880 [2] |
| Naugatex 2005 | .3000 [2] |
| Naugatex 2006 | .2630 [2] |
| Naugatex 2101 | .2850 [2] |
| Naugatex 2105 | .3120 [2] |
| Naugatex X-767 | .3230 [2] |

### Butadiene-Styrene (Cont'd)

| | |
|---|---|
| S 2000 | .2275 [2] |
| S 2004 | .2600 [2] |
| S 2101 | .2250 [2] |

### Neoprene

| | |
|---|---|
| Neoprene Latex 60 | .4000 [2] |
| Neoprene Latex 571 | .3700 [2] |
| Neoprene Latex 572 | .3900 [2] |
| Neoprene Latex 601-A | .4000 [2] |
| Neoprene Latex 735 | .3800 [2] |
| Neoprene Latex 736 | .3800 [2] |
| Neoprene Latex 842-A | .3700 [2] |
| Neoprene Latex 950 | .4700 [2] |

### Polysulfide Rubbers

| | |
|---|---|
| Thiokol Type MX | .7000 [2] |
| Thiokol Type WD-2 | .9200 [2] |
| Thiokol Type WD-6 | .7000 [2] |

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid.

# MARKETS

## NEWS-PRICES

**NEW YORK, JANUARY 9, 1956**

## Reclaimed Rubber

According to trade estimates, about 320,000 long tons of reclaimed rubber were produced in the United States in 1955, surpassing earlier estimates by some 20,000 long tons. The trade consensus seems to be that some 300,000 to 310,000 long tons of reclaim will be produced this year.

It appears likely that as additional supplies of synthetic rubber become available during the year, reclaimers will be forced to seek new outlets for their product. It is not held probable that reclaim prices will be reduced in the foreseeable future.

Inventories of reclaim remained remarkably steady during 1955, and at year-end there were some 25,000 long tons on hand.

The world picture shows that in 1955 approximately 420,000 long tons of reclaim were produced. The U. S., of course, was the largest producer followed by Great Britain and Germany with some 35,000 long tons of reclaim each.

*(Prices for All Areas Except Calif.)*

| | per lb. |
|---|---|
| Premium Grade Whole Tire | .11 |
| First Line Whole Tire | .10½ |
| Second Line Whole Tire | .10 |
| Third Line Whole Tire | .09¾ |
| Fourth Line Whole Tire | .09¼ |
| Black Carcass | .14¾ |
| No. 1 Light Colored Carcass | .20¾ |
| No. 1 Peel | .11 |
| Butyl Tube Reclaim | .16 |
| Natural Rubber Black Tube | .15 |
| Natural Rubber Red Tube | .21 |
| Natural Rubber Gray Tube | .21 |

## Scrap Rubber

Spokesmen for the scrap rubber industry are not too happy over prospects for 1956. During most of 1955, scrap tires moved at a price of under 1c a pound, and the trade does not believe that there will be any upward adjustment in the near future.

It is reported that many of the responsible and dependable scrap accumulators have dispensed with their collections of scrap. Today, a progressively increasing percentage of scrap is being brought to market by independent, individual truckmen. This means that the industry may be experiencing a breakdown in its collection system.

As for the immediate situation, there has been some slight pick-up of activity during the first week in January. Mixed tire orders were reported to be moving fairly well.

*(Prices Delivered Akron)*

| | | |
|---|---|---|
| Mixed tires | ton | 18.00 |
| Light colored carcass | lb. | .05½ |
| No. 1 peelings | ton | 45.00 |
| No. 2 peelings | ton | 30.00 |
| No. 3 peelings | ton | 24.00 |
| Buffings | ton | 17.00 |
| Truck and Bus S.A.G. | ton | 17.00 |
| Passenger S.A.G. | ton | 15.00 |
| Natural Rubber Red Tubes | lb. | .08 |
| Natural Rubber Black Tubes | lb. | .06 |
| Butyl Rubber Tubes | lb. | .06½ |

## Tire Fabrics

Current reports state that rapid progress is now being made by leading rayon manufacturers in developing a much stronger high tenacity rayon yarn for tire cord and other industrial applications. The latest type of high tenacity rayon, now nearing perfection, will have considerably more strength than the "super" rayon tire yarns initially introduced in 1953.

As in the case of the introduction of the first super-strong rayon tire yarn, the development of an even stronger type will have great significance to the market. It will lessen the relative superiority and claimed advantages of nylon tire cord. Introduction of the new rayon cord will also be a big boost for rayon producers in the growing competition between rayon and nylon for the bulk of the big tire cord and related industrial markets.

### *Rayon's Share of Market*

It is reported that, to date, rayon has successfully held on to about 83% of the tire cord market. One big advantage rayon possesses, of course, is in the matter of price.

While complete details are not yet available, the tire trade has already been informed that two leading companies will be in a position to offer new and stronger high tenacity rayon by about next June. The new cord is expected to be about 15% stronger than the present super-strong rayon presently offered. The new cord will probably sell at about a five cent premium over the current super-strong rayon.

The latest developments in rayon tire yarn are a continuation of a long process of development. Rayon for tire cord was first perfected in the thirties; by 1936, two tire companies were using rayon, by 1939, four companies. Up to several years ago, however, most tire cord was made of cotton.

Progress in the use of rayon for tire cord was accelerated greatly during World War II. With cotton in relatively short supply, high tenacity rayon was used by the Armed Forces for virtually all tires.

### *Increases Hold on Market*

After the war, rayon made rapid gains, underselling cotton, and by 1952 had virtually taken over the entire market. In recent years, nylon has become a growing factor in the field, especially for airplane, truck and bus tires. The development of the super-strong rayons in the last few years is seen by many in the trade as the means by which rayon producers can meet the threat of nylon in this field. Whether rayon cord can continue to stand off nylon is problematical. At any rate, happenings in 1956 may give some clue to future trends.

*(Prices f.o.b. Shipping Point)*

**Rayon Tire Cord**

| | | |
|---|---|---|
| 1100 | lb. | .76½ |
| 1650 | lb. | .73½ |
| 2200 | lb. | .73 |

**Nylon Tire Cord**

| | | |
|---|---|---|
| 210 | lb. | 2.00 |
| 840 | lb. | 2.00 |

**Rayon Graded Fabric**

| | | |
|---|---|---|
| 1100 | lb. | .72 |
| 1650 | lb. | .69½ |
| 2200 | lb. | .68½ |

**Cotton Chafers**

| | | |
|---|---|---|
| 14.4 oz. (per square yard) | lb. | .70 |
| 9.25 oz. (per square yard) | lb. | .65 |
| 11.65 oz. (per square yard) | lb. | .61 |
| 8.9 oz. (per square yard) | lb. | .67 |

## Liquid Latex

**Natural:** According to Latex & Rubber, Inc., the December market in Hevea latex featured buyer resistance to prices at the 50c level or above. It is reported that buyers, importers and producers are paying a great deal of attention to the current inventory situation. While some consumers over-purchased during 1955, the majority have been buying "hand-to-mouth" and so are without substantial stocks.

At 50c price levels, purchasers have been unable to estimate their own requirements and sales since 50c latex is an uneconomic raw material for many consumer items. In addition, there has been no real certainty as to the trend of rubber prices. Therefore, purchasers have encountered difficulty in establishing a position.

As can be noted from the statistics, current consumption of Hevea latex continues high, despite the high prices. Consumption for 1955 achieved a new high and early forecasts for 1956 indicate that consumption will continue at accelerated levels.

**Synthetic:** Prices for GR-S type latices within the United States currently range from 22.5 to 32.3c per pound total dry solids in rail tank cars, f.o.b. producing plant. The price range covers different types and concentrations, and it is expected that these prices will hold for the time being.

Prices for neoprene latices currently range from 37 to 47c per pound dry solids in tank cars, f.o.b. Louisville, Ky. Prices for N-type latices range from 46 to 54c per pound dry solids in tank cars f.o.b. point of shipment, minimum freight to buyer's destination within the United States prepaid by the seller.

## Cotton

The price of middling uplands on the New York Cotton Exchange has moved in the rather narrow range of 45 points since our last report (December 9), high for the period being 35.20c reached on December 22, 1955, and low being 34.75c reached on December 13, 1955. The average price of middling uplands for the month of December was 34.95c based on 21 trading days. This compares with an average of 34.87c in the previous month.

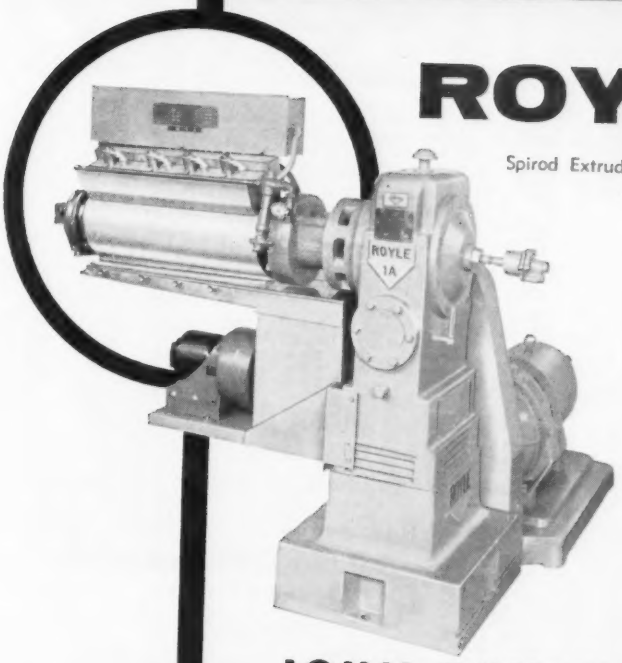
Cotton production in Mexico during the July, 1955-June, 1956, crop year is currently estimated at 2,090,000 bales of 500 pounds gross weight each by the U. S. Department of Agriculture. This is 17% higher than the production of 1,780,000 bales in the 1954-55 crop year.

Mexico's cotton exports during the 1954-55 crop year amounted to 1,253,000 bales, an increase of 31% over that exported in the 1953-54 crop year. Prices of Mexican cotton have been declining since early in 1955. The average price for the first five months of the present season was 16% lower than in the corresponding period of the 1954-55 season.

Several Agriculture Department officials recently stated that price supports on cotton are too high for the farmer's own good and observed that some substantial cut in price is needed. The officials indicated they felt the question was not whether prices should be cut but by how much they should be cut and how fast. There has been some sentiment reported for changing the price support basis from ⅞" middling to 1" middling.

# ROYLE

**1A (2½" cylinder bore)**

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# STATISTICS

## of interest to the rubber industry

## Natural Rubber in the United States

### (Including Latex and Guayule)

*(All Quantities in Long Tons)*

| Year | New Supply | Consumption | Re-Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|
| 1926 | 417,643 | 366,200 | 17,671 | 72,510 |
| 1927 | 431,246 | 373,000 | 27,775 | 99,282 |
| 1928 | 439,731 | 437,000 | 32,159 | 65,454 |
| 1929 | 565,087 | 467,400 | 36,485 | 118,609 |
| 1930 | 487,628 | 376,000 | 30,205 | 201,000 |
| 1931 | 501,788 | 355,200 | 25,609 | 322,000 |
| 1932 | 414,668 | 336,700 | 20,937 | 379,000 |
| 1933 | 418,902 | 412,400 | 20,576 | 365,000 |
| 1934 | 463,018 | 462,500 | 23,856 | 355,000 |
| 1935 | 467,146 | 495,500 | 11,391 | 303,000 |
| 1936 | 488,145 | 575,000 | 12,582 | 223,000 |
| 1937 | 600,479 | 543,600 | 7,902 | 262,204 |
| 1938 | 411,983 | 437,031 | 5,652 | 231,500 |
| 1939 | 499,473 | 592,000 | 13,125 | 125,800 |
| 1940 | 818,243 | 648,500 | 7,060 | 288,864 |
| 1941 | 1,029,007 | 775,000 | 5,376 | 533,344 |
| 1942 | 282,653 | 376,791 | 10,856 | 422,714 |
| 1943 | 55,329 | 317,634 | 20,815 | 139,594 |
| 1944 | 107,834 | 144,113 | 9,665 | 93,650 |
| 1945 | 135,672 | 105,429 | 6,743 | 118,715 |
| 1946 | 400,687 | 277,597 | 4,338 | 237,467 |
| 1947 | 688,354 | 562,661 | 4,101 | 129,038 |
| 1948 | 735,227 | 627,332 | 6,673 | 141,541 |
| 1949 | 660,792 | 574,522 | 6,253 | 106,619 |
| 1950 | 802,249 | 720,268 | 8,644 | 89,215 |
| 1951 | 733,048 | 454,015 | 2,603 | 76,569 |
| 1952 | 805,997 | 453,846 | 3,024 | 95,260 |
| 1953 | 647,150 | 553,473 | 8,376 | 112,316 |
| 1954 | 596,848 | 596,285 | 7,443 | 104,543 |
| 1955: | | | | |
| Jan. | 49,941 | 56,911 | 909 | 101,050 |
| Feb. | 50,880 | 50,997 | 718 | 97,189 |
| Mar. | 61,250 | 58,472 | 691 | 102,058 |
| Apr. | 61,113 | 53,781 | 892 | 101,620 |
| May | 61,042 | 54,746 | 683 | 106,650 |
| June | 52,762 | 56,282 | 682 | 101,491 |
| July | 43,626 | 46,166 | 906 | 105,782 |
| Aug. | 59,840 | 48,359 | 810 | 109,056 |
| Sept. | 50,459 | 50,963 | 980 | 113,185 |
| Oct. | 45,720 | 55,241 | 895 | 112,694 |

Source: U. S. Department of Commerce.

## U. S. Imports of Natural Rubber

| Year | Dry Long Tons | Dry Declared Value | Latex Long Tons | Latex Declared Value | Total Imports |
|---|---|---|---|---|---|
| 1938 | 397,640 | 125,373,864 | 11,944 | 4,168,127 | 409,584 |
| 1939 | 469,946 | 167,586,780 | 27,437 | 10,467,552 | 497,383 |
| 1940 | 781,202 | 303,308,823 | 33,789 | 14,593,466 | 814,991 |
| 1941 | 989,498 | 401,976,317 | 34,797 | 15,965,627 | 1,024,245 |
| 1942 | 266,276 | 112,537,426 | 10,646 | 5,630,667 | 276,922 |
| 1943 | 50,358 | 31,369,198 | 1,890 | 1,312,202 | 52,248 |
| 1944 | 103,847 | 73,908,549 | 3,091 | 2,092,211 | 106,938 |
| 1945 | 134,408 | 95,814,102 | 4,773 | 3,115,853 | 139,181 |
| 1946 | 376,502 | 228,796,110 | 8,421 | 5,843,085 | 384,923 |
| 1947 | 691,087 | 306,951,814 | 17,542 | 9,787,722 | 708,629 |
| 1948 | 702,293 | 290,849,177 | 32,745 | 18,288,223 | 735,038 |
| 1949 | 630,808 | 225,343,624 | 29,743 | 14,968,650 | 660,551 |
| 1950 | 747,109 | 416,222,598 | 54,401 | 41,764,486 | 801,510 |
| 1951 | 677,874 | 727,343,348 | 54,963 | 60,178,309 | 732,837 |
| 1952 | 756,987 | 578,179,519 | 48,228 | 40,563,116 | 805,215 |
| 1953 | 571,635 | 284,909,223 | 75,511 | 46,353,333 | 647,146 |
| 1954 | 522,364 | 219,098,143 | 74,483 | 42,755,029 | 596,847 |
| 1955: | | | | | |
| Jan. | 42,088 | 22,245,606 | 7,853 | 5,473,260 | 49,941 |
| Feb. | 44,770 | 26,161,643 | 6,110 | 4,196,213 | 50,880 |
| Mar. | 53,639 | 33,482,831 | 7,611 | 5,987,304 | 61,250 |
| Apr. | 52,563 | 33,425,499 | 8,549 | 7,235,327 | 61,112 |
| May | 52,192 | 32,621,824 | 8,849 | 6,968,726 | 61,041 |
| June | 45,025 | 27,959,320 | 7,736 | 6,015,080 | 52,761 |
| July | 34,924 | 21,653,274 | 8,702 | 6,855,619 | 43,626 |
| Aug. | 50,954 | 32,782,273 | 8,886 | 7,071,971 | 59,840 |
| Sept. | 42,350 | 29,854,781 | 8,108 | 7,902,094 | 50,458 |

Source: Bureau of the Census, U. S. Department of Commerce.

## World Production of Natural Rubber

### (Including Latex)

*(Long Tons)*

| Year | Malaya | Indonesia | Ceylon | Viet Nam & Cambodia | Latin America | Rest of World* | Total* |
|---|---|---|---|---|---|---|---|
| 1943 | 75,000* | 100,000* | 105,500 | 70,370 | 41,900 | 72,507 | 465,000 |
| 1944 | 25,000* | 50,000* | 98,500 | 60,419 | 49,946 | 77,000 | 360,000 |
| 1945 | 8,600* | 10,000* | 97,500 | 12,000* | 47,125 | 73,570 | 250,000 |
| 1946 | 403,719 | 175,000* | 94,000 | 19,975 | 39,678* | 105,080 | 837,500 |
| 1947 | 646,362 | 277,951 | 89,000 | 38,128 | 34,928* | 172,782 | 1,260,000 |
| 1948 | 698,189 | 432,349 | 95,000 | 43,935 | 29,158* | 225,557 | 1,525,000 |
| 1949 | 671,503 | 432,996 | 89,500 | 43,010 | 27,318* | 225,659 | 1,490,000 |
| 1950 | 694,090 | 696,472 | 113,500 | 48,482 | 26,902* | 280,299 | 1,860,000 |
| 1951 | 605,346 | 814,406 | 105,000 | 52,136 | 29,777* | 278,262 | 1,885,000 |
| 1952 | 584,238 | 750,494 | 96,500 | 63,134 | 35,475* | 261,211 | 1,790,000 |
| 1953 | 574,390 | 692,164 | 98,610 | 74,545 | 35,318* | 250,182 | 1,725,000 |
| 1954 | 584,435 | 738,670 | 93,935 | 78,024 | 26,833* | 280,112 | 1,802,500 |
| 1955: | | | | | | | |
| Feb. | 50,526 | 70,651 | 4,485 | 1,973 | 2,405* | 28,878 | 157,500 |
| Mar. | 52,483 | 47,394 | 4,892 | 4,231 | 2,627* | 28,147 | 140,000 |
| Apr. | 44,716 | 48,198 | 7,049 | 4,708 | 500* | 26,823 | 135,000 |
| May | 49,798 | 47,960 | 5,440 | 5,748 | 500* | 16,998 | 135,000 |
| June | 50,474 | 74,162 | 5,835 | 6,168 | 500* | 26,037 | 165,000 |
| July | 56,030 | 53,779 | 8,457 | .... | 500* | 17,609 | 152,500 |
| Aug. | 54,357 | 63,218 | 9,698 | .... | 500* | 21,407 | 165,000 |
| Sept. | 56,190 | 65,357 | 7,797 | .... | 500* | 20,173 | 167,500 |

Source: International Rubber Study Group. * Estimated.

## World Consumption of Natural and Synthetic Rubber

### (Including Latex)

*(Long Tons)*

| Year | United States | United Kingdom | Canada | Europe* | Rest of World* | Total* |
|---|---|---|---|---|---|---|
| 1943 | 488,525 | 66,730 | 32,896 | 150,000 | 156,104 | 907,500 |
| 1944 | 710,783 | 86,977 | 34,310 | 132,500 | 160,690 | 1,125,000 |
| 1945 | 799,009 | 91,047 | 41,836 | 87,500 | 108,164 | 1,127,500 |
| 1946 | 1,039,296 | 126,770 | 39,196 | 145,000 | 115,804 | 1,467,500 |
| 1947 | 1,122,327 | 156,399 | 61,452 | 242,500 | 153,548 | 1,735,000 |
| 1948 | 1,069,404 | 196,286 | 62,121 | 392,000 | 182,379 | 1,902,500 |
| 1949 | 988,903 | 186,622 | 56,362 | 446,500 | 207,388 | 1,887,500 |
| 1950 | 1,258,557 | 222,425 | 68,695 | 448,500 | 287,055 | 2,285,000 |
| 1951 | 1,214,298 | 238,101 | 70,809 | 476,500 | 314,941 | 2,312,500 |
| 1952 | 1,261,413 | 202,179 | 67,099 | 550,000 | 254,901 | 2,335,000 |
| 1953 | 1,338,309 | 211,453 | 73,394 | 521,000 | 343,606 | 2,500,000 |
| 1954 | 1,233,012 | 247,612 | 71,656 | 544,250 | 408,094 | 2,505,000 |
| 1955: | | | | | | |
| Jan. | 125,290 | 24,645 | 6,128 | 46,250 | 56,372 | 237,500 |
| Feb. | 118,611 | 21,238 | 6,937 | 43,500 | 40,063 | 220,000 |
| Mar. | 135,590 | 22,648 | 7,508 | 48,000 | 54,492 | 250,000 |
| Apr. | 125,059 | 24,872 | 6,829 | 51,750 | 48,921 | 242,500 |
| May | 130,475 | 21,903 | 7,107 | 49,500 | 50,643 | 247,500 |
| June | 136,464 | 19,852 | 7,619 | 52,750 | 56,881 | 255,000 |
| July | 109,498 | 19,710 | 5,443 | 45,750 | 47,307 | 212,500 |
| Aug. | 121,703 | 17,538 | 5,554 | 39,750 | 45,696 | 217,500 |
| Sept. | 128,428 | 21,680 | 7,696 | 49,750 | 46,804 | 240,000 |

Source: International Rubber Study Group. * Estimated.

## U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

*(All Quantities in Long Tons)*

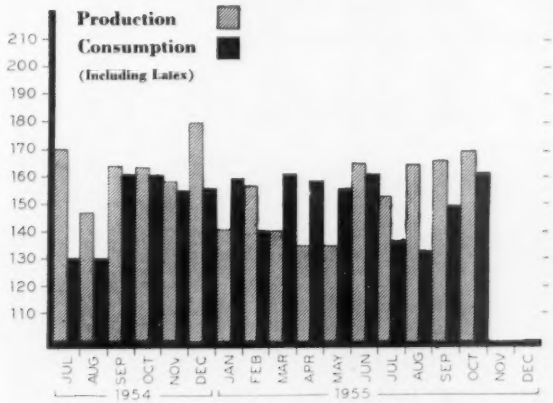
| Year | Balata Tons | Balata Value | Jelutong Tons | Jelutong Value | Gutta-Percha & Other Guttas Tons | Gutta-Percha & Other Guttas Value |
|---|---|---|---|---|---|---|
| 1944 | 1,012 | 660,805 | 88 | 45,578 | 10 | 4,999 |
| 1945 | 1,361 | 907,253 | .... | ..... | 36 | 21,970 |
| 1946 | 2,281 | 2,233,065 | 304 | 256,169 | 423 | 458,064 |
| 1947 | 1,982 | 2,276,531 | 2,878 | 1,496,887 | 392 | 779,591 |
| 1948 | 1,195 | 805,078 | 3,401 | 2,377,765 | 423 | 542,788 |
| 1949 | 1,391 | 814,554 | 1,043 | 834,978 | 197 | 189,021 |
| 1950 | 2,117 | 1,589,885 | 1,789 | 1,515,162 | 541 | 745,418 |
| 1951 | 2,452 | 1,973,271 | 1,669 | 2,608,359 | 383 | 430,539 |
| 1952 | 988 | 762,994 | 1,636 | 2,094,983 | 282 | 385,890 |
| 1953 | 1,619 | 866,248 | 1,027 | 1,166,837 | 235 | 303,116 |
| 1954 | 949 | 504,065 | 2,196 | 2,624,926 | 417 | 511,055 |
| 1954: | | | | | | |
| Nov. | 108 | 76,392 | 156 | 188,426 | 27 | 49,170 |
| Dec. | 83 | 49,271 | 145 | 169,503 | 17 | 20,087 |
| 1955: | | | | | | |
| Jan. | 41 | 48,160 | 205 | 247,639 | 12 | 24,628 |
| Feb. | 28 | 24,321 | 129 | 102,572 | 37 | 36,566 |
| Mar. | 72 | 48,365 | 184 | 205,480 | 36 | 48,134 |
| Apr. | 83 | 58,184 | 113 | 122,952 | 36 | 32,463 |
| May | 44 | 35,402 | 121 | 119,278 | 52 | 48,021 |
| June | 93 | 61,821 | 119 | 115,511 | 46 | 50,901 |
| July | 105 | 66,771 | 146 | 163,189 | 17 | 16,588 |
| Aug. | 67 | 41,052 | 124 | 123,655 | 13 | 14,860 |
| Sept. | 151 | 181,535 | 97 | 105,884 | 10 | 9,295 |

Source: U. S. Department of Commerce.

# STATISTICS at a glance

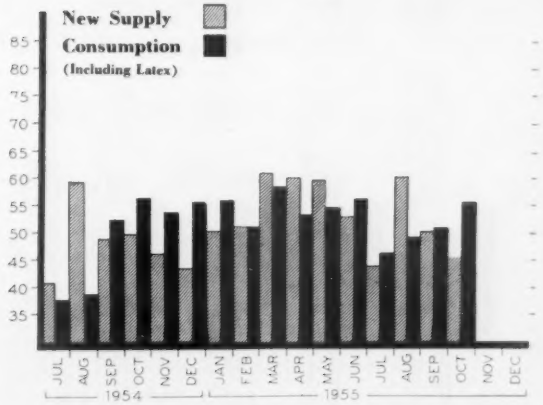
## NATURAL RUBBER—WORLD

*(thousands of long tons)*



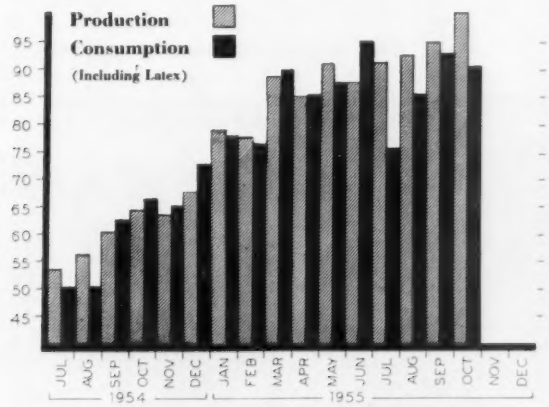

## NATURAL RUBBER—UNITED STATES

*(thousands of long tons)*



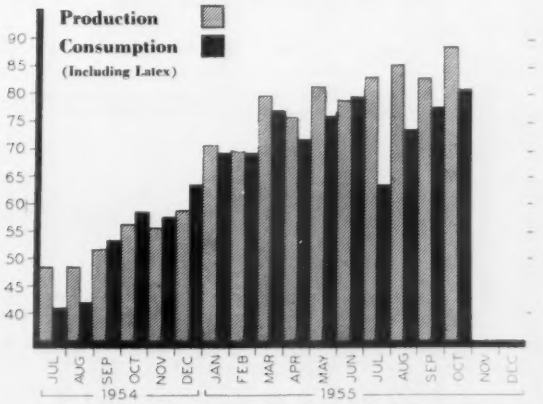

## SYNTHETIC RUBBER—WORLD

*(thousands of long tons)*



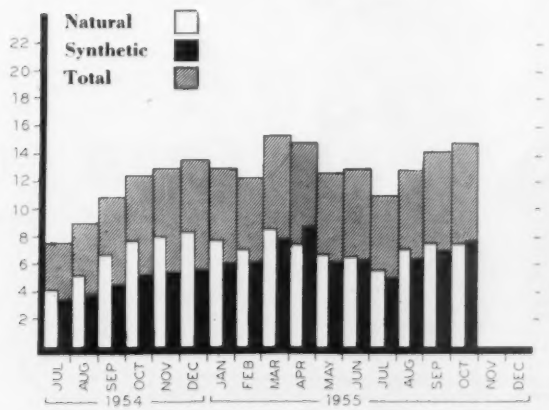

## SYNTHETIC RUBBER—UNITED STATES

*(thousands of long tons)*



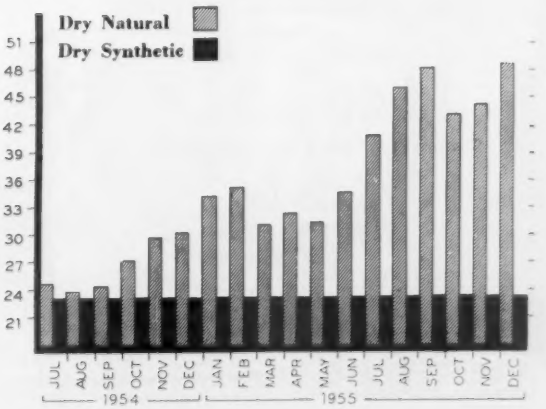

## LATEX CONSUMPTION IN THE U. S.

*(thousands of long tons)*




## PRICES—NATURAL AND SYNTHETIC

*(cents per pound)*



# Synthetic Rubber in the United States

*(All Quantities in Long Tons)*

## New Supply

| Year | GR-S | Neoprene | Butyl | N-Type | Total |
|---|---|---|---|---|---|
| 1946 | 613,408 | 47,766 | 80,823 | 5,738 | 747,735 |
| 1947 | 408,858 | 31,495 | 62,824 | 6,618 | 509,795 |
| 1948 | 405,492 | 34,848 | 56,662 | 7,012 | 504,014 |
| 1949 | 310,539 | 35,215 | 54,046 | 11,072 | 410,932 |
| 1950 | 378,887 | 50,067 | 60,915 | 12,037 | 501,906 |
| 1951 | 704,529 | 58,907 | 76,475 | 15,333 | 855,244 |
| 1952 | 654,854 | 65,745 | 81,630 | 16,228 | 818,447 |
| 1953 | 680,728 | 80,495 | 79,801 | 20,198 | 861,222 |
| 1954 | 490,405 | 69,150 | 58,802 | 21,396 | 639,753 |
| 1955: | | | | | |
| Jan. | 59,043 | 6,983 | 3,220 | 2,099 | 71,345 |
| Feb. | 56,442 | 6,910 | 3,727 | 1,729 | 68,808 |
| Mar. | 65,169 | 7,132 | 5,256 | 2,158 | 79,715 |
| Apr. | 60,826 | 8,359 | 5,148 | 2,534 | 76,867 |
| May | 66,827 | 7,852 | 5,115 | 3,122 | 82,916 |
| June | 65,367 | 5,919 | 3,872 | 3,850 | 79,008 |
| July | 66,503 | 6,904 | 5,395 | 3,700 | 82,502 |
| Aug. | 68,835 | 8,511 | 4,203 | 3,224 | 84,773 |
| Sept. | 68,157 | 7,677 | 5,097 | 3,142 | 83,973 |
| Oct. | 73,097 | 6,848 | 8,501 | 3,327 | 88,773 |

## Consumption

| | | | | | |
|---|---|---|---|---|---|
| 1946 | 632,126 | 44,357 | 79,228 | 5,988 | 761,699 |
| 1947 | 448,589 | 37,703 | 68,838 | 4,536 | 559,666 |
| 1948 | 345,313 | 32,118 | 58,870 | 5,771 | 442,072 |
| 1949 | 299,420 | 31,753 | 50,855 | 8,827 | 414,381 |
| 1950 | 416,230 | 43,781 | 66,348 | 11,930 | 538,289 |
| 1951 | 626,444 | 48,887 | 70,500 | 13,066 | 758,897 |
| 1952 | 666,420 | 55,522 | 71,229 | 13,866 | 807,037 |
| 1953 | 624,181 | 65,900 | 77,826 | 16,929 | 784,836 |
| 1954 | 500,345 | 57,203 | 61,464 | 17,715 | 636,727 |
| 1955: | | | | | |
| Jan. | 56,371 | 5,676 | 4,478 | 1,854 | 68,379 |
| Feb. | 56,000 | 5,476 | 4,312 | 1,826 | 67,614 |
| Mar. | 63,737 | 6,423 | 4,839 | 2,119 | 77,118 |
| Apr. | 59,746 | 5,884 | 4,321 | 2,095 | 72,046 |
| May | 62,858 | 6,143 | 4,455 | 1,953 | 75,409 |
| June | 65,892 | 6,320 | 4,704 | 2,566 | 79,482 |
| July | 53,628 | 4,294 | 3,894 | 2,056 | 63,872 |
| Aug. | 59,746 | 6,450 | 4,307 | 2,841 | 73,344 |
| Sept. | 63,330 | 6,197 | 4,578 | 2,613 | 76,718 |
| Oct. | 66,945 | 6,739 | 4,719 | 3,137 | 81,540 |

## Exports

| | | | | | |
|---|---|---|---|---|---|
| 1946 | 68,763 | 2,642 | 495 | 797 | 72,697 |
| 1947 | 7,951 | 2,617 | 62 | 755 | 11,385 |
| 1948 | 1,093 | 2,875 | 21 | 885 | 4,874 |
| 1949 | 1,401 | 3,330 | 178 | 1,574 | 6,483 |
| 1950 | 900 | 4,826 | 31 | 1,895 | 7,652 |
| 1951 | 483 | 6,825 | 216 | 1,725 | 9,249 |
| 1952 | 9,467 | 9,813 | 126 | 2,695 | 22,101 |
| 1953 | 7,692 | 11,494 | 237 | 3,245 | 22,668 |
| 1954 | 11,069 | 12,062 | 2,831 | 4,155 | 30,117 |
| 1955: | | | | | |
| Jan. | 1,381 | 1,046 | 716 | 194 | 3,337 |
| Feb. | 1,331 | 1,049 | 370 | 259 | 3,009 |
| Mar. | 2,162 | 1,287 | 672 | 236 | 4,357 |
| Apr. | 1,807 | 1,636 | 1,562 | 506 | 5,511 |
| May | 3,500 | 1,430 | 376 | 357 | 5,663 |
| June | 6,030 | 1,541 | 726 | 389 | 8,686 |
| July | 5,212 | 1,275 | 870 | 472 | 7,829 |
| Aug. | 7,727 | 1,454 | 837 | 386 | 10,407 |
| Sept. | 8,598 | 1,946 | 526 | 602 | 11,672 |
| Oct. | 8,162 | 1,700 | 682 | 494 | 11,038 |

## Stocks

| | | | | | |
|---|---|---|---|---|---|
| 1946 | 81,486 | 10,470 | 19,478 | 3,755 | 115,186 |
| 1947 | 40,606 | 5,237 | 13,184 | 3,339 | 62,366 |
| 1948 | 96,282 | 5,072 | 10,995 | 2,762 | 115,111 |
| 1949 | 77,731 | 4,654 | 12,224 | 3,433 | 98,042 |
| 1950 | 36,942 | 5,733 | 7,243 | 2,840 | 52,758 |
| 1951 | 105,271 | 8,379 | 12,481 | 3,821 | 129,912 |
| 1952 | 83,861 | 8,535 | 22,716 | 3,875 | 118,987 |
| 1953 | 135,153 | 11,480 | 24,866 | 4,346 | 175,845 |
| 1954 | 115,499 | 11,349 | 19,267 | 4,280 | 150,395 |
| 1955: | | | | | |
| Jan. | 114,976 | 11,598 | 17,079 | 4,160 | 147,813 |
| Feb. | 111,796 | 10,555 | 15,424 | 3,885 | 141,660 |
| Mar. | 113,594 | 11,037 | 15,096 | 3,786 | 143,513 |
| Apr. | 112,156 | 10,863 | 14,813 | 3,586 | 140,788 |
| May | 114,216 | 10,283 | 14,449 | 4,033 | 142,981 |
| June | 108,679 | 9,755 | 13,053 | 3,803 | 135,320 |
| July | 110,281 | 11,213 | 13,288 | 5,528 | 140,310 |
| Aug. | 108,211 | 11,326 | 12,395 | 5,525 | 137,457 |
| Sept. | 107,641 | 11,209 | 12,190 | 5,452 | 136,492 |
| Oct. | 105,902 | 10,458 | 12,122 | 5,188 | 133,670 |

Source: U. S. Department of Commerce.

# Natural and Synthetic Rubber Latex in the United States

*(All Quantities in Long Tons)*

## New Supply

| Year | Natural | GR-S | Neoprene | N-Type | Total Synthetic | Grand Total |
|---|---|---|---|---|---|---|
| 1943 | 1,890 | 194 | 1,512 | ..... | 1,706 | 3,596 |
| 1944 | 3,090 | 6,580 | 4,683 | ..... | 11,263 | 14,353 |
| 1945 | 4,768 | 15,176 | 7,077 | ..... | 22,253 | 27,021 |
| 1946 | 8,012 | 24,810 | 13,595 | ..... | 38,405 | 46,417 |
| 1947 | 17,675 | 22,474 | 6,089 | ..... | 28,563 | 46,238 |
| 1948 | 32,630 | 21,494 | 5,022 | ..... | 26,516 | 59,146 |
| 1949 | 29,974 | 21,357 | 3,651 | ..... | 25,008 | 54,982 |
| 1950 | 54,401 | 31,339 | 5,725 | ..... | 37,064 | 91,465 |
| 1951 | 54,963 | 32,972 | 6,866 | 2,948 | 42,786 | 97,749 |
| 1952 | 48,228 | 42,273 | 7,598 | 4,164 | 54,035 | 102,263 |
| 1953 | 75,511 | 48,112 | 9,026 | 5,844 | 62,982 | 138,493 |
| 1954 | 74,483 | 48,379 | 8,214 | 6,866 | 63,459 | 137,942 |
| 1954: | | | | | | |
| Oct. | 7,210 | 5,190 | 742 | 780 | 6,712 | 13,922 |
| Nov. | 6,335 | 5,115 | 717 | 558 | 6,390 | 12,725 |
| Dec. | 8,888 | 5,238 | 729 | 624 | 6,591 | 15,479 |
| 1955: | | | | | | |
| Jan. | 7,853 | 6,199 | 617 | 624 | 7,440 | 15,293 |
| Feb. | 6,110 | 5,634 | 797 | 641 | 7,072 | 13,182 |
| Mar. | 7,611 | 7,078 | 854 | 672 | 8,604 | 16,215 |
| Apr. | 8,550 | 5,680 | 975 | 1,022 | 7,677 | 16,527 |
| May | 8,849 | 5,292 | 880 | 808 | 6,980 | 15,829 |
| June | 7,736 | 4,688 | 905 | 1,434 | 7,027 | 14,763 |
| July | 8,702 | 4,753 | 641 | 993 | 6,387 | 15,089 |
| Aug. | 8,885 | 4,456 | 881 | 917 | 6,254 | 15,139 |
| Sept. | 8,109 | 5,698 | 994 | 1,086 | 7,778 | 18,887 |
| Oct. | 6,900 | 6,204 | 897 | 861 | 7,962 | 14,862 |

## Consumption[1]

| | | | | | | |
|---|---|---|---|---|---|---|
| 1943 | 9,578 | 150 | 1,400 | .... | 1,550 | 11,128 |
| 1944 | 6,085 | 6,000 | 4,400 | .... | 10,400 | 16,485 |
| 1945 | 3,886 | 14,500 | 6,800 | .... | 21,300 | 25,186 |
| 1946 | 5,714 | 23,500 | 13,000 | .... | 36,500 | 42,214 |
| 1947 | 13,909 | 22,500 | 6,500 | .... | 29,000 | 42,909 |
| 1948 | 28,489 | 21,500 | 5,250 | .... | 26,750 | 55,239 |
| 1949 | 36,117 | 21,500 | 3,750 | .... | 25,250 | 61,367 |
| 1950 | 56,138 | 31,000 | 5,500 | .... | 36,500 | 92,638 |
| 1951 | 46,750 | 31,031 | 6,279 | 2,628 | 39,938 | 86,688 |
| 1952 | 53,567 | 40,562 | 7,368 | 3,093 | 51,023 | 104,590 |
| 1953 | 67,375 | 46,473 | 7,981 | 3,654 | 58,108 | 125,483 |
| 1954 | 75,931 | 44,173 | 7,251 | 4,507 | 55,931 | 131,862 |
| 1954: | | | | | | |
| Oct. | 7,527 | 4,347 | 612 | 376 | 5,335 | 12,862 |
| Nov. | 7,622 | 4,411 | 631 | 411 | 5,453 | 13,075 |
| Dec. | 7,671 | 4,575 | 600 | 460 | 5,635 | 13,306 |
| 1955: | | | | | | |
| Jan. | 7,355 | 4,537 | 661 | 506 | 5,704 | 13,059 |
| Feb. | 7,066 | 4,881 | 689 | 501 | 6,071 | 13,137 |
| Mar. | 8,415 | 5,861 | 828 | 509 | 7,198 | 15,613 |
| Apr. | 7,732 | 5,209 | 748 | 601 | 6,558 | 14,290 |
| May | 6,643 | 4,728 | 768 | 493 | 5,989 | 12,632 |
| June | 6,589 | 4,885 | 722 | 587 | 6,194 | 12,783 |
| July | 5,469 | 3,830 | 535 | 626 | 4,991 | 10,460 |
| Aug. | 6,784 | 4,514 | 770 | 810 | 6,094 | 12,878 |
| Sept. | 7,452 | 5,505 | 730 | 878 | 7,113 | 14,565 |
| Oct. | 7,322 | 5,705 | 781 | 990 | 7,476 | 14,798 |

## Stocks at End of Period

| | | | | | | |
|---|---|---|---|---|---|---|
| 1943 | 5,638 | .... | .... | .... | .... | 5,638 |
| 1944 | 2,443 | .... | .... | .... | .... | 2,443 |
| 1945 | 3,121 | .... | .... | .... | .... | 3,121 |
| 1946 | 4,865 | .... | .... | .... | .... | 4,865 |
| 1947 | 5,033 | .... | .... | .... | .... | 5,033 |
| 1948 | 11,235 | .... | .... | .... | .... | 11,235 |
| 1949 | 5,063 | .... | .... | .... | .... | 5,063 |
| 1950 | 4,927 | .... | .... | .... | .... | 4,927 |
| 1951 | 4,752 | 3,727 | 1,245 | 532 | 5,504 | 10,256 |
| 1952 | 6,201 | 5,040 | 1,019 | 902 | 6,961 | 13,162 |
| 1953 | 13,532 | 4,794 | 1,117 | 721 | 6,632 | 20,164 |
| 1954 | 11,133 | 5,134 | 1,087 | 811 | 7,032 | 18,165 |
| 1954: | | | | | | |
| Oct. | 10,952 | 4,745 | 1,001 | 950 | 6,696 | 17,648 |
| Nov. | 9,759 | 4,943 | 1,055 | 939 | 6,937 | 16,696 |
| Dec. | 9,933 | 5,134 | 1,087 | 811 | 7,032 | 16,965 |
| 1955: | | | | | | |
| Jan. | 9,684 | 5,861 | 1,067 | 812 | 7,740 | 17,424 |
| Feb. | 8,619 | 5,753 | 879 | 663 | 7,295 | 15,914 |
| Mar. | 7,820 | 6,940 | 909 | 637 | 8,486 | 16,306 |
| Apr. | 6,790 | 7,098 | 786 | 703 | 8,587 | 15,377 |
| May | 8,854 | 7,021 | 767 | 817 | 8,605 | 17,459 |
| June | 9,788 | 6,645 | 817 | 883 | 8,335 | 18,123 |
| July | 11,934 | 6,950 | 850 | 1,397 | 9,197 | 21,131 |
| Aug. | 11,962 | 6,201 | 885 | 1,319 | 8,405 | 20,367 |
| Sept. | 12,595 | 6,448 | 975 | 1,527 | 8,950 | 21,545 |
| Oct. | 12,072 | 5,684 | 750 | 1,373 | 7,807 | 19,879 |

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

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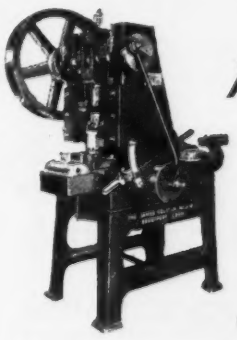

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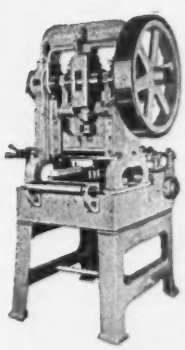

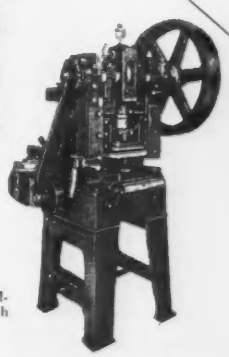

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MODEL A2 ▶
Precision cutting for multiple heels, half and full soles with stock grain.

MODEL A2s
*(not illustrated)*
Precision cutting across grain of stock.

MODEL A3 ▶
Precision cutting of multiple heels and taps with or across stock grain.

* *Since 1896*

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## Rubber Industry Employment Earnings and Hours

### All Rubber Products

| Mo. | 1954 Production Workers (thousands) | 1954 Average Weekly Earnings | 1954 Average Weekly Hours | 1954 Average Hourly Earnings | 1955 Production Workers (thousands) | 1955 Average Weekly Earnings | 1955 Average Weekly Hours | 1955 Average Hourly Earnings |
|---|---|---|---|---|---|---|---|---|
| Jan. | 203.8 | $74.69 | 38.7 | $1.93 | 208.5 | $83.84 | 41.3 | $2.03 |
| Feb. | 200.5 | 75.08 | 38.9 | 1.93 | 209.4 | 84.25 | 41.3 | 2.04 |
| Mar. | 196.6 | 74.31 | 38.5 | 1.93 | 211.6 | 83.64 | 41.0 | 2.04 |
| Apr. | 192.4 | 74.88 | 38.8 | 1.93 | 210.9 | 86.53 | 41.8 | 2.07 |
| May | 194.2 | 77.81 | 39.7 | 1.96 | 215.7 | 87.36 | 42.0 | 2.08 |
| June | 195.6 | 79.60 | 40.2 | 1.98 | 219.0 | 88.83 | 42.3 | 2.10 |
| July | 171.0 | 76.44 | 39.4 | 1.94 | 215.7 | 86.32 | 41.3 | 2.09 |
| Aug. | 174.9 | 75.85 | 39.1 | 1.94 | 217.9 | 86.73 | 41.3 | 2.10 |
| Sept. | 196.3 | 77.42 | 39.3 | 1.97 | 220.6 | .... | .... | .... |
| Oct. | 201.6 | 81.20 | 40.4 | 2.01 | .... | .... | .... | .... |
| Nov. | 202.1 | 83.02 | 41.1 | 2.02 | .... | .... | .... | .... |
| Dec. | 206.8 | 84.85 | 41.8 | 2.03 | .... | .... | .... | .... |

### Tires and Tubes

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jan. | 84.5 | 82.88 | 37.5 | 2.21 | 85.3 | 97.41 | 41.1 | 2.37 |
| Feb. | 82.9 | 83.03 | 37.4 | 2.21 | 86.5 | 96.46 | 40.7 | 2.37 |
| Mar. | 81.9 | 80.99 | 36.6 | 2.21 | 87.4 | 95.51 | 40.3 | 2.37 |
| Apr. | 80.4 | 84.14 | 37.9 | 2.22 | 88.6 | 102.18 | 42.4 | 2.41 |
| May | 81.1 | 88.65 | 39.4 | 2.25 | 89.8 | 101.88 | 42.1 | 2.42 |
| June | 82.2 | 92.06 | 40.2 | 2.29 | 91.0 | 105.60 | 43.1 | 2.45 |
| July | 65.2 | 87.01 | 38.5 | 2.26 | 91.5 | 103.33 | 42.7 | 2.42 |
| Aug. | 65.9 | 85.65 | 37.4 | 2.29 | 91.8 | 102.97 | 42.2 | 2.44 |
| Sept. | 82.6 | 86.18 | 38.3 | 2.25 | .... | .... | .... | .... |
| Oct. | 83.9 | 90.39 | 39.3 | 2.30 | .... | .... | .... | .... |
| Nov. | 81.2 | 94.54 | 40.4 | 2.34 | .... | .... | .... | .... |
| Dec. | 84.5 | 98.18 | 41.6 | 2.36 | .... | .... | .... | .... |

### Rubber Footwear

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jan. | 21.5 | 62.98 | 38.4 | 1.64 | 22.1 | 68.97 | 40.1 | 1.72 |
| Feb. | 20.5 | 65.57 | 39.5 | 1.66 | 21.5 | 69.72 | 40.3 | 1.73 |
| Mar. | 19.6 | 65.51 | 39.7 | 1.65 | 21.5 | 69.72 | 40.3 | 1.73 |
| Apr. | 19.2 | 63.58 | 38.3 | 1.66 | 21.5 | 70.82 | 40.7 | 1.74 |
| May | 19.8 | 65.46 | 39.2 | 1.67 | 21.3 | 70.07 | 40.5 | 1.73 |
| June | 19.8 | 67.30 | 40.3 | 1.67 | 21.6 | 71.34 | 41.0 | 1.74 |
| July | 20.1 | 68.45 | 40.5 | 1.69 | 21.8 | 70.99 | 40.8 | 1.74 |
| Aug. | 20.5 | 66.40 | 40.0 | 1.66 | 22.1 | 67.82 | 39.2 | 1.73 |
| Sept. | 21.0 | 66.08 | 39.1 | 1.69 | .... | .... | .... | .... |
| Oct. | 21.9 | 71.34 | 41.0 | 1.74 | .... | .... | .... | .... |
| Nov. | 22.3 | 71.51 | 41.1 | 1.74 | .... | .... | .... | .... |
| Dec. | 22.3 | 71.69 | 41.2 | 1.74 | .... | .... | .... | .... |

### All Other Rubber Products

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Jan. | 97.8 | 70.62 | 39.9 | 1.77 | 101.1 | 76.08 | 41.8 | 1.82 |
| Feb. | 97.1 | 70.40 | 40.0 | 1.76 | 101.4 | 76.86 | 42.0 | 1.83 |
| Mar. | 95.1 | 70.22 | 39.9 | 1.76 | 102.7 | 76.49 | 41.8 | 1.83 |
| Apr. | 92.8 | 69.30 | 39.6 | 1.75 | 101.0 | 76.54 | 41.6 | 1.84 |
| May | 93.3 | 70.98 | 40.1 | 1.77 | 104.6 | 78.68 | 42.3 | 1.86 |
| June | 93.6 | 70.98 | 40.1 | 1.77 | 106.4 | 77.93 | 41.9 | 1.86 |
| July | 85.7 | 70.62 | 39.9 | 1.77 | 102.4 | 74.37 | 40.2 | 1.85 |
| Aug. | 88.5 | 77.15 | 40.2 | 1.77 | 104.0 | 76.26 | 41.0 | 1.86 |
| Sept. | 92.7 | 72.36 | 40.2 | 1.80 | .... | .... | .... | .... |
| Oct. | 95.8 | 74.98 | 41.2 | 1.82 | .... | .... | .... | .... |
| Nov. | 98.6 | 75.71 | 41.6 | 1.82 | .... | .... | .... | .... |
| Dec. | 100.0 | 76.44 | 42.0 | 1.82 | .... | .... | .... | .... |

Source: U. S. Department of Labor.
Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

## Spot Closing Cotton Prices

*(Middling Upland Grade—New York Market—in Cents)*

### Average Monthly Price Per Pound

| | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 36.09 | 33.37 | 31.89 | 45.04 | 42.96 | 33.24 | 34.15 | 35.07 |
| Feb. | 33.63 | 33.41 | 32.79 | (a) | 41.64 | 33.76 | 35.00 | 35.04 |
| Mar. | 35.04 | 33.44 | 32.65 | 46.06 | 41.70 | 34.10 | 35.23 | 34.33 |
| Apr. | 38.10 | 33.84 | 33.23 | 46.06 | 41.79 | 33.85 | 35.22 | 34.23 |
| May | 38.57 | 33.73 | 33.64 | 46.06 | 39.98 | 34.30 | 35.34 | 34.80 |
| June | 38.12 | 33.56 | 34.61 | 46.06 | 41.31 | 34.11 | 35.17 | 34.83 |
| July | 34.89 | 32.99 | 38.11 | 46.21 | 40.37 | 34.20 | 35.37 | 34.61 |
| Aug. | 32.23 | 32.06 | 38.53 | 35.93 | 40.42 | 33.82 | 35.19 | 34.53 |
| Sept. | 31.92 | 30.94 | 41.62 | 36.20 | 39.75 | 33.69 | 35.46 | 33.85 |
| Oct. | 32.01 | 30.32 | 40.66 | 38.13 | 37.52 | 33.53 | 35.24 | 33.93 |
| Nov. | 32.15 | 30.52 | 43.11 | 42.70 | 35.59 | 33.60 | 34.80 | 34.87 |
| Dec. | 32.90 | 31.08 | 43.37 | 43.32 | 33.76 | 33.52 | 35.03 | 34.95 |
| Average for Year | 34.64 | 32.44 | 37.05 | 42.43 | 39.71 | 33.81 | 35.10 | 34.59 |

Note: The Government established a ceiling price of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

## Production Index for the Rubber Industry

### (1947-1949 = 100)

### (Based on man-hours)

| | 1953 | 1954 | 1955 | | 1953 | 1954 | 1955 |
|---|---|---|---|---|---|---|---|
| Jan. | 132 | 114 | 145 | July | 114 | 85 | 121 |
| Feb. | 140 | 114 | 144 | Aug. | 122 | 94 | 133 |
| Mar. | 143 | 118 | 146 | Sept. | 122 | 118 | 145 |
| Apr. | 140 | 116 | 147 | Oct. | 127 | 132 | 157 |
| May | 137 | 118 | 146 | Nov. | 120 | 124 | ... |
| June | 131 | 121 | 151 | Dec. | 111 | 128 | ... |

## Sales by the Rubber Industry

### (in Millions of Dollars*)

| | 1953 | 1954 | 1955 | | 1953 | 1954 | 1955 |
|---|---|---|---|---|---|---|---|
| Jan. | 434 | 361 | 424 | July | 460 | 393 | 471 |
| Feb. | 442 | 360 | 440 | Aug. | 424 | 352 | 456 |
| Mar. | 452 | 378 | 466 | Sept. | 414 | 346 | 456 |
| Apr. | 443 | 382 | 445 | Oct. | 405 | 346 | ... |
| May | 443 | 378 | 465 | Nov. | 360 | 404 | ... |
| June | 442 | 385 | 465 | Dec. | 372 | 417 | ... |

## Rubber Manufacturers' Inventories

### (in Millions of Dollars*)

| | 1953 | 1954 | 1955 | | 1953 | 1954 | 1955 |
|---|---|---|---|---|---|---|---|
| Jan. | 839 | 835 | 790 | July | 901 | 787 | 853 |
| Feb. | 839 | 848 | 782 | Aug. | 888 | 754 | 863 |
| Mar. | 854 | 844 | 805 | Sept. | 899 | 799 | 874 |
| Apr. | 857 | 813 | 784 | Oct. | 878 | 835 | ... |
| May | 868 | 798 | 810 | Nov. | 865 | 811 | ... |
| June | 893 | 817 | 850 | Dec. | 859 | 821 | ... |

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

## No. 1 R.S.S.—Annual Average Prices

*(New York Market—Cents per Pound)*

| Year | High | Low | Avg. | Year | High | Low | Avg. |
|---|---|---|---|---|---|---|---|
| 1914 | 93 | 56 | 65.33 | 1935 | 13¾ | 10½ | 12.37 |
| 1915 | 79 | 58½ | 65.85 | 1936 | 23 | 13½ | 16.41 |
| 1916 | 102 | 55 | 72.50 | 1937 | 26⅛ | 14 | 19.39 |
| 1917 | 90 | 52 | 72.23 | 1938 | 17⅞ | 10¼ | 14.64 |
| 1918 | 70 | 40 | 60.15 | 1939 | 24 | 14¼ | 17.57 |
| 1919 | 57 | 38½ | 48.70 | 1940 | 24 | 18¼ | 20.10 |
| 1920 | 56½ | 16 | 36.30 | 1941 | 24⅞ | 19⅛ | 22.40 |
| 1921 | 21¼ | 11½ | 16.36 | 1942 | 22½ | 22½ | 22.50 |
| 1922 | 28⅛ | 13⅜ | 17.50 | 1943 | 22½ | 22½ | 22.50 |
| 1923 | 37⅛ | 24¼ | 29.45 | 1944 | 22½ | 22½ | 22.50 |
| 1924 | 40⅛ | 17⅜ | 26.20 | 1945 | 22½ | 22½ | 22.50 |
| 1925 | 121 | 34⅛ | 72.46 | 1946 | 22½ | 22½ | 22.50 |
| 1926 | 88½ | 36¼ | 48.50 | 1947 | 25 | 14 | 20.00 |
| 1927 | 41¾ | 33 | 37.72 | 1948 | 25 | 18 | 21.99 |
| 1928 | 41¼ | 17 | 22.48 | 1949 | 19¾ | 15⅜ | 17.57 |
| 1929 | 26⅞ | 15½ | 20.55 | 1950 | 86 | 18 | 41.10 |
| 1930 | 16½ | 7½ | 11.98 | 1951 | 76 | 52 | (a) |
| 1931 | 8⅜ | 4¼ | 6.17 | 1952* | 33 | 26½ | 29.15 |
| 1932 | 4¾ | 2½ | 3.49 | 1953 | 31⅜ | 19⅜ | 24.21 |
| 1933 | 9¾ | 2⅞ | 5.96 | 1954 | 34½ | 19½ | 23.61 |
| 1934 | 15⅞ | 8¾ | 12.92 | 1955 | 52 | 29⅜ | 39.16 |

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

## No. 1 R.S.S.—Monthly Average Prices

*(New York Market—Cents per pound)*

| | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 21.83 | 19.23 | 18.33 | 71.21 | .... | 29.40 | 20.22 | 33.92 |
| Feb. | 20.42 | 18.49 | 19.40 | 73.61 | .... | 27.57 | 19.98 | 34.90 |
| Mar. | 20.33 | 19.08 | 19.86 | 72.05 | .... | 26.59 | 20.16 | 31.08 |
| Apr. | 22.87 | 18.53 | 23.51 | .... | .... | 24.66 | 22.06 | 31.75 |
| May | 23.39 | 17.92 | 28.07 | .... | .... | 25.52 | 21.96 | 31.35 |
| June | 22.80 | 16.36 | 30.92 | .... | .... | 24.42 | 23.01 | 34.74 |
| July | 24.24 | 16.45 | 39.10 | .... | 30.52 | 23.64 | 24.12 | 40.84 |
| Aug. | 23.63 | 16.60 | 51.63 | .... | 29.36 | 23.36 | 23.26 | 45.85 |
| Sept. | 22.81 | 17.58 | 55.98 | .... | 27.42 | 23.06 | 23.99 | 48.27 |
| Oct. | 22.13 | 16.31 | 62.19 | .... | 27.26 | 20.82 | 26.57 | 43.81 |
| Nov. | 20.52 | 16.70 | 73.05 | .... | 29.25 | 20.58 | 28.07 | 44.95 |
| Dec. | 18.86 | 17.53 | 71.20 | .... | 31.26 | 20.92 | 29.88 | 48.40 |
| Average for Year | 21.99 | 17.57 | 41.10 | (a) | 29.15 | 24.21 | 23.61 | 39.16 |

Note: (a) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

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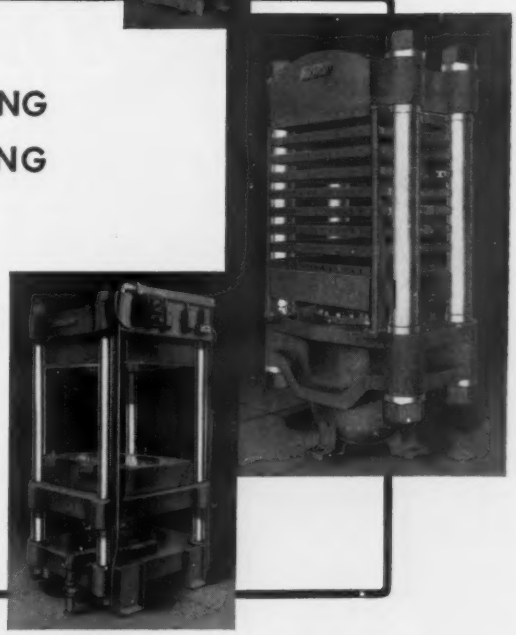

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## Automotive Pneumatic Casings

*(Thousands of Units)*

| | Shipments | | | | | |
|---|---|---|---|---|---|---|
| | Original Equipment | Replacement | Export | Total | Production | Inventory End of Period |
| 1945 (total) .... | 5,984 | 36,479 | 504 | 42,967 | 44,524 | 3,077 |
| Passenger Car. | 1,115 | 25,463 | 222 | 26,800 | 28,200 | 2,214 |
| Truck and Bus | 4,869 | 11,016 | 282 | 16,167 | 16,324 | 863 |
| **1946 (total) ....** | **15,310** | **65,490** | **1,512** | **82,312** | **82,298** | **2,448** |
| Passenger Car. | 11,086 | 54,684 | 653 | 66,423 | 66,466 | 1,763 |
| Truck and Bus | 4,224 | 10,806 | 859 | 15,889 | 15,832 | 685 |
| **1947 (total) ....** | **25,056** | **62,871** | **3,256** | **91,183** | **95,550** | **6,949** |
| Passenger Car. | 19,644 | 52,857 | 1,608 | 74,109 | 77,795 | 5,444 |
| Truck and Bus | 5,412 | 10,014 | 1,648 | 17,074 | 17,755 | 1,505 |
| **1948 (total) ....** | **26,845** | **49,148** | **1,787** | **77,781** | **81,314** | **10,698** |
| Passenger Car. | 21,589 | 41,295 | 656 | 63,540 | 66,738 | 8,773 |
| Truck and Bus | 5,256 | 7,853 | 1,132 | 14,241 | 14,576 | 1,925 |
| **1949 (total) ....** | **31,584** | **43,466** | **1,467** | **76,517** | **76,369** | **10,638** |
| Passenger Car. | 28,129 | 36,440 | 509 | 65,077 | 65,140 | 8,904 |
| Truck and Bus | 3,456 | 7,026 | 958 | 11,440 | 11,228 | 1,734 |
| **1950 (total) ....** | **41,349** | **56,808** | **1,430** | **99,587** | **92,754** | **3,794** |
| Passenger Car. | 36,678 | 47,103 | 642 | 84,423 | 78,598 | 3,050 |
| Truck and Bus | 4,671 | 9,705 | 788 | 15,164 | 14,156 | 743 |
| **1951 (total) ....** | **32,153** | **44,612** | **1,677** | **78,442** | **83,405** | **8,765** |
| Passenger Car. | 26,729 | 34,226 | 723 | 61,678 | 65,546 | 6,973 |
| Truck and Bus | 5,424 | 10,386 | 954 | 16,764 | 17,859 | 1,791 |
| **1952 (total) ....** | **29,484** | **54,342** | **1,520** | **85,346** | **90,411** | **14,110** |
| Passenger Car. | 24,106 | 45,458 | 741 | 70,305 | 74,341 | 11,251 |
| Truck and Bus | 5,378 | 8,884 | 779 | 15,041 | 16,070 | 2,859 |
| **1953 (total) ....** | **37,949** | **55,124** | **1,543** | **94,617** | **96,150** | **15,720** |
| Passenger Car. | 33,106 | 45,798 | 809 | 79,713 | 81,455 | 13,044 |
| Truck and Bus | 4,843 | 9,326 | 734 | 14,904 | 14,696 | 2,676 |
| **1954 (total) ....** | **33,333** | **55,155** | **1,753** | **90,241** | **89,141** | **14,762** |
| Passenger Car. | 29,741 | 47,044 | 928 | 77,713 | 76,794 | 12,217 |
| Truck and Bus | 3,591 | 8,111 | 826 | 12,528 | 12,347 | 2,545 |
| 1955: | | | | | | |
| Jan. (total) .... | 3,785 | 4,967 | 159 | 8,911 | 9,040 | 14,949 |
| Passenger Car. | 3,481 | 4,139 | 79 | 7,699 | 7,797 | 12,363 |
| Truck and Bus | 303 | 827 | 81 | 1,211 | 1,243 | 2,586 |
| Feb. (total) .... | 3,833 | 4,281 | 157 | 8,272 | 8,745 | 15,368 |
| Passenger Car. | 3,540 | 3,551 | 83 | 7,174 | 7,549 | 12,687 |
| Truck and Bus | 294 | 730 | 74 | 1,098 | 1,196 | 2,681 |
| Mar. (total) .... | 4,780 | 4,926 | 201 | 9,907 | 10,083 | 15,609 |
| Passenger Car. | 4,326 | 4,254 | 104 | 8,685 | 8,810 | 12,875 |
| Truck and Bus | 454 | 672 | 96 | 1,222 | 1,273 | 2,734 |
| Apr. (total) .... | 4,457 | 5,315 | 165 | 9,937 | 9,153 | 14,890 |
| Passenger Car. | 3,967 | 4,677 | 89 | 8,733 | 8,000 | 12,197 |
| Truck and Bus | 489 | 639 | 76 | 1,204 | 1,153 | 2,692 |
| May (total) .... | 4,352 | 5,361 | 152 | 9,865 | 9,949 | 14,936 |
| Passenger Car. | 3,871 | 4,705 | 87 | 8,663 | 8,742 | 12,235 |
| Truck and Bus | 481 | 656 | 65 | 1,202 | 1,208 | 2,701 |
| June (total) .... | 3,931 | 6,129 | 174 | 10,234 | 10,703 | 15,460 |
| Passenger Car. | 3,482 | 5,399 | 97 | 8,979 | 9,383 | 12,698 |
| Truck and Bus | 449 | 730 | 76 | 1,255 | 1,320 | 2,763 |
| July (total) .... | 3,890 | 5,711 | 128 | 9,729 | 9,027 | 14,684 |
| Passenger Car. | 3,461 | 4,802 | 76 | 8,339 | 7,893 | 12,199 |
| Truck and Bus | 429 | 909 | 51 | 1,389 | 1,134 | 2,485 |
| Aug. (total) .... | 3,362 | 5,980 | 119 | 9,462 | 8,717 | 13,908 |
| Passenger Car. | 2,984 | 5,058 | 60 | 8,103 | 7,585 | 11,636 |
| Truck and Bus | 378 | 922 | 59 | 1,359 | 1,132 | 2,272 |
| Sept. (total) .... | 3,142 | 5,170 | 140 | 8,453 | 9,125 | 14,674 |
| Passenger Car. | 2,749 | 4,366 | 74 | 7,189 | 7,882 | 12,407 |
| Truck and Bus | 393 | 804 | 66 | 1,264 | 1,242 | 2,267 |
| Oct. (total) .... | 3,495 | 4,460 | 161 | 8,117 | 9,555 | 16,163 |
| Passenger Car. | 3,172 | 3,556 | 74 | 6,802 | 8,160 | 13,806 |
| Truck and Bus | 324 | 904 | 88 | 1,315 | 1,395 | 2,357 |

Source: The Rubber Manufacturers Association, Inc.

## Automobile Production in U. S.

**(Civilian Production Only)**

| Year | Passenger Cars | Trucks | Total | Year | Passenger Cars | Trucks | Total |
|---|---|---|---|---|---|---|---|
| **1935** | **3,252,244** | **694,690** | **3,946,934** | 1945 | 83,792 | 313,643 | 397,435 |
| **1936** | **3,669,528** | **781,862** | **4,451,390** | 1946 | 2,148,699 | 930,760 | 3,079,459 |
| **1937** | **3,915,889** | **892,382** | **4,808,271** | **1947** | **3,558,178** | **1,220,634** | **4,778,812** |
| **1938** | **2,000,985** | **485,852** | **2,486,837** | **1948** | **3,909,270** | **1,363,856** | **5,273,126** |
| **1939** | **2,866,796** | **704,308** | **3,571,104** | **1949** | **5,108,841** | **1,123,736** | **6,232,577** |
| **1940** | **3,692,328** | **721,637** | **4,413,965** | **1950** | **6,665,836** | **1,332,263** | **7,998,099** |
| **1941** | **3,744,500** | **875,381** | **4,619,681** | **1951** | **5,337,729** | **1,420,432** | **6,758,161** |
| **1942** | **220,814** | **133,083** | **353,897** | **1952** | **4,320,794** | **1,212,790** | **5,533,584** |
| **1943** | **0** | **4,501** | **4,501** | **1953** | **6,121,787** | **1,202,196** | **7,323,983** |
| **1944** | **0** | **124,819** | **124,819** | **1954** | **5,558,897** | **1,038,045** | **6,596,942** |
| 1954: | | | | | | | |
| Jan. | 454,562 | 96,167 | 550,729 | July | 451,663 | 78,507 | 530,170 |
| Feb. | 446,676 | 87,141 | 533,817 | Aug. | 445,306 | 75,835 | 521,141 |
| Mar. | 531,529 | 101,177 | 632,706 | Sept. | 300,998 | 68,618 | 369,616 |
| Apr. | 534,667 | 96,723 | 631,390 | Oct. | 221,195 | 66,138 | 287,160 |
| May | 497,062 | 91,226 | 588,288 | Nov. | 498,248 | 89,232 | 587,480 |
| June | 507,055 | 91,470 | 598,525 | Dec. | 669,936 | 95,811 | 765,747 |
| 1955: | | | | | | | |
| Jan. | 635,513 | 89,676 | 725,189 | July | 658,736 | 109,589 | 768,325 |
| Feb. | 677,705 | 67,061 | 744,766 | Aug. | 620,610 | 95,119 | 715,729 |
| Mar. | 791,280 | 102,992 | 894,272 | Sept. | 467,845 | 91,894 | 559,739 |
| Apr. | 753,434 | 127,887 | 881,321 | Oct. | 505,177 | 95,610 | 600,787 |
| May | 721,139 | 127,941 | 849,080 | Nov. | 745,993 | 114,448 | 860,441 |
| June | 647,658 | 119,215 | 766,873 | Dec. | ..... | ..... | ..... |

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy

## Automotive Inner Tubes

*(Thousands of Units)*

| | Shipments | | | | | |
|---|---|---|---|---|---|---|
| Year | Original Equipment | Replacement | Export | Total | Production | Inventory End of Period |
| 1945 | 5,988 | 33,906 | 411 | 40,304 | 41,742 | 3,627 |
| 1946 | 15,327 | 59,357 | 1,424 | 76,108 | 77,251 | 3,820 |
| 1947 | 25,046 | 46,560 | 2,483 | 74,088 | 79,181 | 8,059 |
| 1948 | 26,833 | 40,548 | 1,119 | 68,499 | 70,033 | 9,641 |
| 1949 | 31,521 | 31,450 | 887 | 63,858 | 65,114 | 10,657 |
| 1950 | 41,240 | 42,671 | 811 | 84,723 | 80,179 | .... |
| 1951 | 32,151 | 32,284 | 1,071 | 65,507 | 67.249 | 10,094 |
| 1952 | 29.451 | 32,985 | 1,014 | 63,449 | 65,073 | 12,036 |
| 1953 | 37.957 | 36,072 | 878 | 74,907 | 74,425 | 11,874 |
| 1954 | 25,071 | 35,576 | 945 | 61,593 | 48,279 | 9,519 |
| 1955: | | | | | | |
| Jan. | 413 | 3,629 | 74 | 4,116 | 3,089 | 8,252 |
| Feb. | 352 | 2,430 | 80 | 2,862 | 2,850 | 8,244 |
| Mar. | 491 | 2,732 | 105 | 3,327 | 3,234 | 8,217 |
| Apr. | 530 | 2,635 | 85 | 3,250 | 2,836 | 7,963 |
| May | 531 | 2,617 | 84 | 3,233 | 3,005 | 7,735 |
| June | 477 | 3,003 | 85 | 3,565 | 3,136 | 7,326 |
| July | 475 | 2,915 | 60 | 3,450 | 2,768 | 6,664 |
| Aug. | 394 | 3,269 | 70 | 3,733 | 2,923 | 5,917 |
| Sept. | 360 | 2,814 | 86 | 3,261 | 3,169 | 5,966 |
| Oct. | 319 | 2,595 | 89 | 3,004 | 3,119 | 6,286 |

Source: The Rubber Manufacturers Association, Inc.

## Vinyl and Vinyl Copolymer Resins—Sales

*(Thousands of Pounds—Resin Content)*

| | Polyvinyl Chloride and Copolymer Resins | | | | | | | All Other Vinyl Resins | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Film | Sheeting | Molding & Extrusion | Textile & Paper Treating | Flooring | Protective Coatings | All Other Uses | Adhesives | All Other Uses | Grand Total |
| **1953** | **63,691** | **62,385** | **129,215** | **52,353** | **22,152** | **22,823** | **27,790** | **22,411** | **77,478** | **480,299** |
| **1954** | **69,943** | **56,588** | **147,284** | **49,546** | **34,890** | **23,676** | **35,148** | **26,609** | **74,090** | **517,773** |
| **1954** | | | | | | | | | | |
| July | 5,114 | 3,441 | 9,648 | 3,105 | 3,356 | 1,859 | 2,598 | 1,951 | 5,010 | 36,082 |
| Aug. | 7,078 | 4,522 | 14,541 | 4,259 | 3,931 | 2,198 | 3,407 | 2,444 | 5,804 | 48,183 |
| Sept. | 5,665 | 4,340 | 13,454 | 3,784 | 3,797 | 2,242 | 3,779 | 2,379 | 5,768 | 45,208 |
| Oct. | 5,427 | 4,227 | 13,456 | 3,890 | 3,688 | 2,198 | 3,515 | 2,215 | 6,765 | 45,381 |
| Nov. | 6,857 | 4,132 | 14,057 | 4,537 | 4,099 | 2,131 | 3,653 | 2,235 | 7,318 | 49,019 |
| Dec. | 6,087 | 3,963 | 14,850 | 4,548 | 3,796 | 2,066 | 3,268 | 1,867 | 6,921 | 47,366 |
| 1955 | | | | | | | | | | |
| Jan. | 6,291 | 4,455 | 15,441 | 4,512 | 4,341 | 2,288 | 3,600 | 2,576 | 7,705 | 51,208 |
| Feb. | 6,666 | 4,205 | 15,748 | 4,829 | 4,812 | 2,285 | 3,801 | 2,352 | 7,761 | 52,400 |
| Mar. | 8,052 | 4,429 | 16,102 | 5,402 | 5,208 | 2,815 | 4,336 | 2,859 | 8,865 | 58,068 |
| Apr. | 8,227 | 4,709 | 15,568 | 5,279 | 5,134 | 2,601 | 3,271 | 2,585 | 8,967 | 56,842 |
| May | 6,985 | 4,429 | 14,452 | 5,240 | 5,109 | 2,449 | 3,547 | 2,809 | 9,237 | 54,256 |
| June | 7,103 | 3,970 | 14,832 | 5,036 | 4,318 | 2,139 | 4,403 | 2,322 | 8,508 | 52,630 |
| July | 5,925 | 3,765 | 11,943 | 4,304 | 3,601 | 2,027 | 3,540 | 2,605 | 6,919 | 44,631 |
| Aug. | 6,478 | 3,359 | 13,265 | 5,136 | 4,599 | 2,105 | 4,759 | 2,868 | 8,799 | 51,367 |
| Sept. | 6,983 | 4,166 | 15,412 | 5,582 | 4,707 | 2,313 | 4,017 | 3,072 | 9,129 | 55,382 |

Source: Chemical Division, U. S. Tariff Commission.

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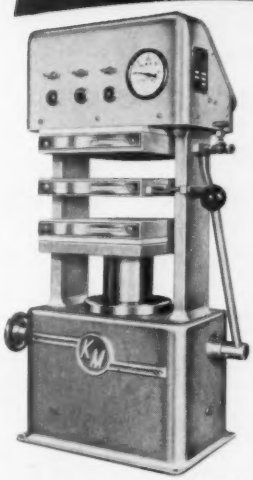

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## Various Compounding Materials Consumed by the Rubber Industry

| Material | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 |
|---|---|---|---|---|---|---|---|
| Antimony, Primary: | | | | | | | |
| Short tons | 39 | 41 | 55 | 103[c] | 19[c] | 66 | 20 |
| % of total | .002 | .003 | .005 | .007 | .001 | .004 | .001 |
| Asphalt: [a] | | | | | | | |
| Short tons | 32,113 | 19,967 | 18,050 | 26,819 | 21,414 | 33,288 | ..... |
| % of total | 0.7 | 0.4 | 0.3 | 0.3 | 0.3 | 0.4 | ..... |
| Barite (Barytes): | | | | | | | |
| Short tons | 17,000 | 18,000 | 14,000 | 19,000 | 15,000 | 14,000 | ..... |
| % of total | 3.1 | 2.85 | 2.53 | 3.31 | 2.13 | 2.0 | ..... |
| Carbon Black: | | | | | | | |
| Short tons | 471,790 | 435,282 | 383,565 | 515,184 | 530,614 | 537,273 | 566,797 |
| % of total | 94.3 | 95.5 | 93.3 | 92.9 | 93.9 | 93.1 | 94.4 |
| Clay, Kaolin: | | | | | | | |
| Short tons | 166,201 | 176,965 | 197,341 | 263,306 | 231,331 | 240,982 | ..... |
| % of total | 11.5 | 11.3 | 13.1 | 15.0 | 12.7 | 13.2 | ..... |
| Clay, Fire & Stoneware: | | | | | | | |
| Short tons | 17,970 | 15,480 | 27,148 | 9,500 | ..... | 9,322 | ..... |
| % of total | 0.2 | 0.2 | 0.3 | 0.1 | ..... | 0.1 | ..... |
| Lime: | | | | | | | |
| Short tons | 589 | 1,154 | 715 | 908 | 1,126 | 2,000 | ..... |
| % of total | 0.01 | 0.02 | .0002 | .0002 | [d] | [d] | ..... |
| Litharge: | | | | | | | |
| Short tons | 2,205 | 2,835 | 1,398 | 3,047 | 2,641 | 2,109 | ..... |
| % of total | 1.3 | 1.8 | 1.2 | 1.7 | 1.7 | 1.5 | ..... |
| Lithopone: | | | | | | | |
| Short tons | 3.085 | 4,192 | 3,245 | 4,092 | 3,295 | 1,523 | 1,723 |
| % of total | 1.9 | 3.0 | 4.1 | 3.9 | 3.2 | 2.5 | 3.3 |
| Mica, Ground: | | | | | | | |
| Short tons | 3,900 | 4,372 | 3,856 | 5,776 | 6,551 | 5,126 | ..... |
| % of total | 6.0 | 7.0 | 7.0 | 8.0 | 9.0 | 7.0 | ..... |
| Sulfur: | | | | | | | |
| Short tons | 72,800 | 70,560 | 59,360 | 75,000 | 75,000 | 75,000 | ..... |
| % of total | 1.8 | 1.7 | 1.5 | 1.3 | 1.6 | 1.6 | ..... |
| Talc: [b] | | | | | | | |
| Short tons | 71,840 | 66,226 | 53,400 | 75,900 | 70,970 | 64,476 | ..... |
| % of total | 13.9 | 13.0 | 12.0 | 12.0 | 11.2 | 10.9 | ..... |
| Zinc Oxide: | | | | | | | |
| Short tons | 82,248 | 82,895 | 58,496 | 82,944 | 71,507 | 72,774 | 78,439 |
| % of total | 51.2 | 54.9 | 52.5 | 51.6 | 48.4 | 51.2 | 52.7 |

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible.

## Reclaimed Rubber

### (Including Natural and Synthetic)

*(All Quantities in Long Tons)*

| Year | New Supply | Consumption: Tons | Consumption: % to Crude [a] | Exports | Stocks On Hand at End of Period |
|---|---|---|---|---|---|
| 1938 | 122,400 | 120,800 | 27.6 | 7,403 | 23,000 |
| 1939 | 186,000 | 170,000 | 28.7 | 12,611 | 25,250 |
| 1940 | 208,971 | 190,244 | 29.3 | 11,347 | 32,636 |
| 1941 | 274,202 | 251,231 | 32.2 | 13,851 | 41,750 |
| 1942 | 286,007 [b] | 254,820 | 64.6 | 30,405 | 42,532 |
| 1943 | 304,058 [c] | 291,082 | 59.6 | 15,678 | 46,201 |
| 1944 | 260.631 [d] | 251,083 | 35.3 | 11,800 | 43,832 |
| 1945 | 243,309 | 241,036 | 30.2 | 13,413 | 28,155 |
| 1946 | 295,612 | 275,410 | 26.5 | 14,461 | 33,666 |
| 1947 | 291,395 | 288,395 | 24.8 | 14,556 | 35,943 |
| 1948 | 266,861 | 261,113 | 24.4 | 11,428 | 32,630 |
| 1949 | 224,029 | 226,679 | 22.5 | 10,637 | 28,263 |
| 1950 | 314,008 | 303,733 | 24.1 | 11,740 | 35,708 |
| 1951 | 366,700 | 346,121 | 26.6 | 14,722 | 45,082 |
| 1952 | 274,981 | 280,002 | 22.2 | 11,180 | 30,664 |
| 1953 | 298,336 | 285,050 | 21.3 | 11,597 | 32,319 |
| 1954 | 258,101 | 249,049 | 20.2 | 10,232 | 30,746 |
| 1954: | | | | | |
| Dec. | 25,790 | 24,546 | 20.5 | 816 | 30,746 |
| 1955: | | | | | |
| Jan. | 25,336 | 25,322 | 20.2 | 1,041 | 29,656 |
| Feb. | 25,444 | 24,333 | 20.5 | 1,085 | 30,125 |
| Mar. | 29,574 | 28,674 | 21.1 | 1,088 | 30,311 |
| Apr. | 26,817 | 26,609 | 21.3 | 1,088 | 30,068 |
| May | 27,911 | 27,652 | 21.2 | 1,056 | 29,528 |
| June | 30,451 | 29,157 | 21.5 | 1,128 | 29,725 |
| July | 24,114 | 22,563 | 20.6 | 1,176 | 29,939 |
| Aug. | 25,223 | 25,790 | 21.2 | 1,144 | 27,956 |
| Sept. | 26,512 | 26,340 | 20.6 | 1,018 | 27,110 |
| Oct. | 28,029 | 26,606 | 19.5 | 1,081 | 27,457 |

Source: U. S. Department of Commerce.
Notes: (1) These figures are revised from time to time and the latest available issue should be consulted for the most accurate data. (a) Includes natural and synthetic rubber. (b) Includes 893 tons of imports. (c) Includes 67 tons of imports. (d) Includes 21 tons of imports.

## Cotton, Rayon and Nylon Tire Fabrics

*(In Thousands of Pounds)*

| | Production: Rayon Tire Cord Not Woven | Production: Rayon Tire Cord Woven | Production: Cotton and Nylon Cord & Fabric [a] | Production: Chafer Fabrics (all fibers) | Production: Total Tire Cord and Fabric | Stocks [b]: Cotton and Nylon Cord & Fabric | Stocks [b]: Rayon Cord and Fabric |
|---|---|---|---|---|---|---|---|
| 1954: | | | | | | | |
| Jan.-Mar. | 17,297 | 73,068 | 7,905 | 13,228 | 111,499 | n.a. | n.a. |
| Apr.-June | 15,257 | 63,975 | 12,424 | 12,867 | 104,523 | 6,975 | 56,497 |
| July-Sept. | 12,851 | 50,136 | 8,858 | 9,321 | 81,166 | 7,321 | 47,572 |
| Oct.-Dec. | 14,609 | 76,931 | 13,081 | 12,476 | 117,097 | 7,654 | 47,061 |
| Total | 60,014 | 264,110 | 42,268 | 47,893 | 414,285 | .... | .... |
| 1955: | | | | | | | |
| Jan.-Mar. | 20,299 | 79,191 | 14,870 | 12,763 | 127,123 | 6,863 | 44,239 |
| Apr.-June | 21,550 | 81,036 | 18,898 | 12,724 | 134,208 | 8,870 | 40,689 |
| July-Sept. | 20,740 | 81,968 | 16,046 | 12,941 | 131,695 | 9,729 | 47,272 |
| Oct.-Dec. | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Total | ..... | ..... | ..... | ..... | ..... | ..... | ..... |

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

## Gasoline Consumption

*(In Thousands of Barrels of 42 Gallons)*

| | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 |
|---|---|---|---|---|---|---|---|---|
| Jan. | 61,308 | 63,125 | 66,981 | 80,670 | 86,863 | 89,634 | 89,852 | 96,397 |
| Feb. | 56,487 | 57,980 | 53,274 | 72,864 | 82,043 | 86,458 | 86,206 | 88,464 |
| Mar. | 68,171 | 73,282 | 78,780 | 86,962 | 87,065 | 98,158 | 101,549 | 105,684 |
| Apr. | 72,183 | 75,318 | 80,350 | 87,573 | 98,653 | 102,044 | 103,866 | 111,116 |
| May | 77,186 | 81,665 | 89,035 | 100,266 | 101,137 | 105,918 | 104,418 | 115,707 |
| June | 78,044 | 83,374 | 90,174 | 96,364 | 99,305 | 114,703 | 113,037 | 120,710 |
| July | 81,428 | 83,129 | 91,677 | 100,567 | 105.307 | 112,960 | 112,231 | 115,653 |
| Aug. | 80,351 | 84,707 | 94,507 | 101,453 | 102,954 | 109,124 | 110,223 | 121,816 |
| Sep. | 76,159 | 80,832 | 86,725 | 91,891 | 100,095 | 106,158 | 104,706 | 113,379 |
| Oct. | 75,164 | 79,327 | 89,067 | 100,209 | 103,689 | 106,037 | 105,607 | ..... |
| Nov. | 72,560 | 76,346 | 82,688 | 88,581 | 91,326 | 99,210 | 102,393 | ..... |
| Dec. | 72,162 | 75,628 | 81,032 | 84,551 | 95,817 | 100,225 | 104,258 | ..... |
| | 871,270 | 913,713 | 994,290 | 1,091,951 | 1,154,254 | 1,230,629 | 1,238,346 | ..... |

Source: U. S. Bureau of Mines.

## Rim Production

| | 1950 | 1951 | 1952 | 1953 | 1954 |
|---|---|---|---|---|---|
| Passenger Car | 35,096,404 | 29,145,367 | 24,936,844 | 31,318,461 | 25,952,322 |
| Truck & Bus | 6,625,129 | 6,877,419 | 5,752,674 | 5,228,321 | 4,463,689 |
| Agricultural | 2,853,483 | 3,019,581 | 2,073,116 | 1,943,487 | 1,297,040 |
| Earth Mover | 15,602 | 28,026 | 31,791 | 24,685 | 21,536 |
| Total | 44,590,618 | 39,070,393 | 32,794,425 | 38,514,954 | 31,734,587 |

| | 1955: June | July | Aug. | Sept. | Oct. | Nov. |
|---|---|---|---|---|---|---|
| Passenger Car | 3,308,984 | 2,654,118 | 2,840,789 | 2,154,381 | 2,831,566 | 3,424,887 |
| Truck & Bus | 716,348 | 480,443 | 590,638 | 512,676 | 495,813 | 539,802 |
| Agricultural | 148,454 | 85,798 | 158,962 | 114,971 | 141,336 | 149,358 |
| Earth Mover | 3,051 | 3,728 | 2,554 | 3,601 | 4,494 | 5,343 |
| Total | 4,176,837 | 3,224,087 | 3,592,952 | 2,785,629 | 3,473,209 | 4,119,390 |

Source: The Tire & Rim Association, Inc.


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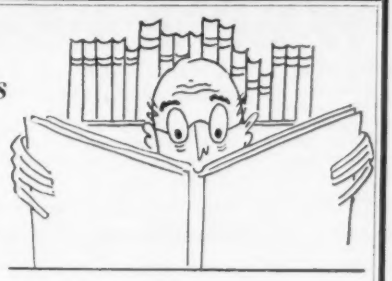

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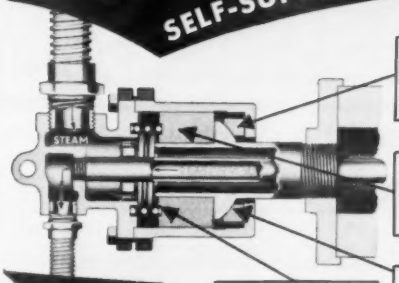


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*"Help Wanted" continued on next page*

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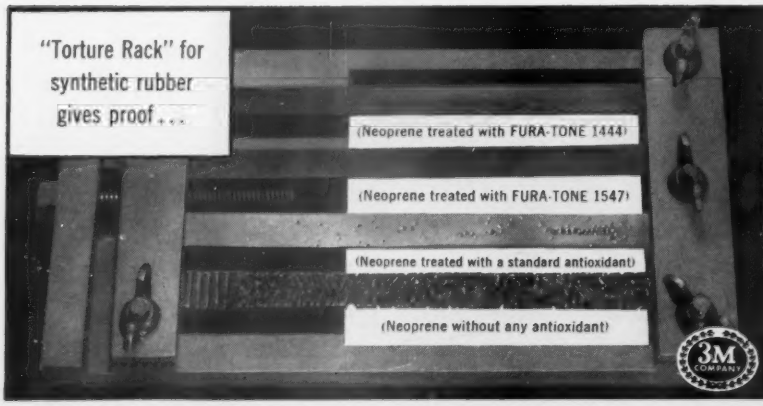
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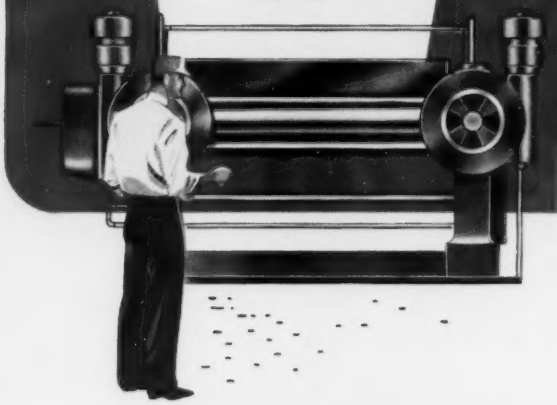

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FEBRUARY, 1956

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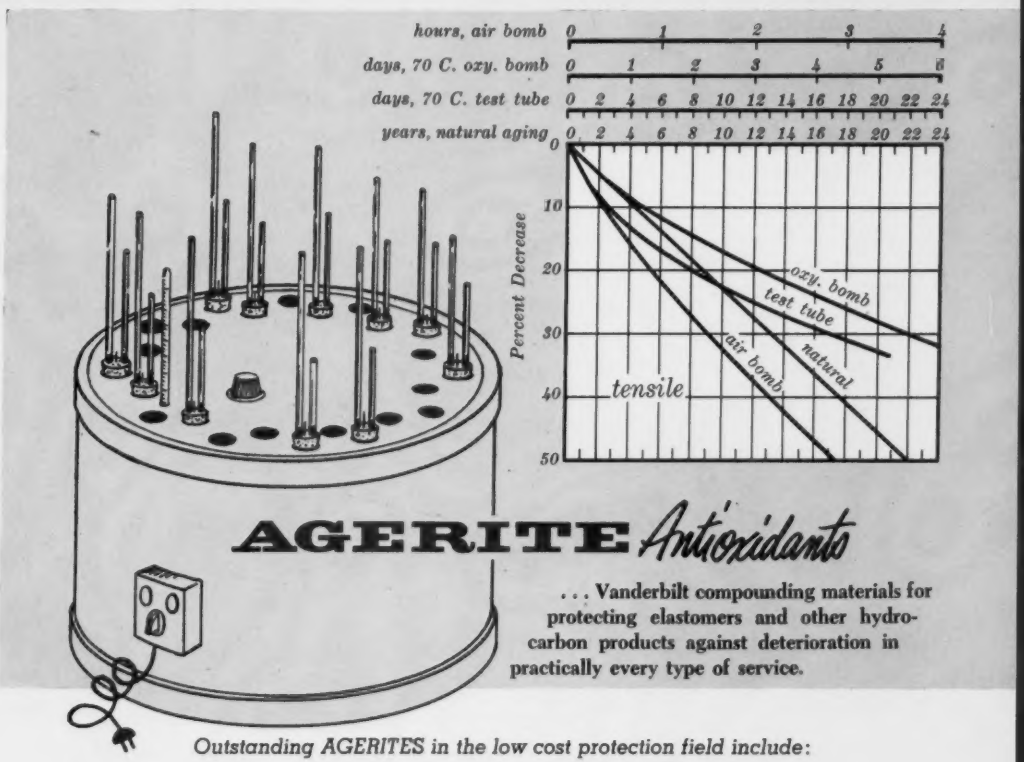
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